

RENEWABLE OXYGENATE RULE IN THE  
REFORMULATED GASOLINE PROGRAM

Y 4. AG 8/3: S. HRG. 103-1057

Renewable Oxygenate Rule in the Ref... RINGS

BEFORE THE

SUBCOMMITTEE ON  
NUTRITION AND INVESTIGATIONS  
OF THE

COMMITTEE ON AGRICULTURE,  
NUTRITION, AND FORESTRY  
UNITED STATES SENATE

ONE HUNDRED THIRD CONGRESS

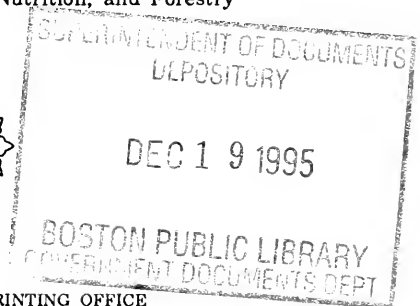
SECOND SESSION

ON

RENEWABLE OXYGENATE RULE IN THE REFORMULATED  
GASOLINE PROGRAM

MAY 27, 1994

Printed for the use of the  
Committee on Agriculture, Nutrition, and Forestry



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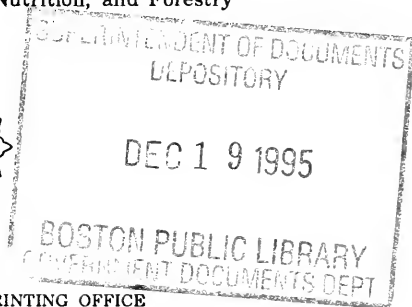
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# C O N T E N T S

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	Page
Statements	
Hon. Tom Harkin, U.S. Senator from Iowa .....	1
Hon. Thomas A. Daschle, U.S. Senator from South Dakota .....	4
Prepared statement .....	6
Hon. Charles E. Grassley, U.S. Senator from Iowa .....	8
Prepared statement .....	10
Hon. J. James Exon, U.S. Senator from Nebraska .....	12
Hon. Richard G. Lugar, U.S. Senator from Indiana .....	14
Hon. Paul D. Wellstone, U.S. Senator from Minnesota .....	15
Hon. Malcolm Wallop, U.S. Senator from Wyoming, prepared statement .....	16
John W. McClelland, Agricultural Economist, Office of Energy, U.S. Department of Agriculture, Washington, DC.; accompanied by Michael Graboski, director, Colorado Institute for Fuels and High Altitude Engine Research, Colorado School of Mines, Golden, CO .....	19
Richard Wilson, Director, Office of Mobile Sources, U.S. Environmental Protection Agency, Washington, DC. ....	23

## APPENDIX

Additional material submitted for the record	
Statement of Senator Charles E. Grassley before the EPA, with attachments .....	45
Letter to President Bill Clinton, from the Honorable Charles E. Grassley, U.S. Senator from Iowa .....	64
Press Release—Senator Charles E. Grassley (May 12, 1994) .....	67
Letter to the Honorable J. Bennett Johnston, Chairman, Senate Energy Committee, from the Honorable Charles E. Grassley, U.S. Senator from Iowa .....	68
Prepared statements	
John W. McClelland, with attachments .....	69
Richard Wilson .....	91



# RENEWABLE OXYGENATE RULE IN THE REFORMULATED GASOLINE PROGRAM

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FRIDAY, MAY 27, 1994

UNITED STATES SENATE,  
SUBCOMMITTEE ON NUTRITION AND INVESTIGATIONS,  
COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY,  
*Washington, DC.*

The committee met, pursuant to notice, at 10:05 a.m., in room SD-628, Dirksen Senate Office Building, Hon. Tom Harkin, Chairman of the subcommittee, presiding.

Present or submitting a statement: Senators Harkin, Daschle, Exon, Wellstone, Lugar, Grassley, and Wallop.

## STATEMENT OF HON. TOM HARKIN, A U.S. SENATOR FROM IOWA

Senator HARKIN. The Senate Agriculture Committee will come to order.

We are here this morning because, in December of last year, the Environmental Protection Agency issued a proposed rule providing renewable oxygenates a share of the market for reformulated gasoline which must be sold in our smoggiest cities beginning January 1, 1995, under an amendment that Senator Daschle and I worked to include in the Clean Air Act.

Of course, the most prominent of these renewable oxygenates are ethanol and ETBE, but the rule would also include other oxygenates as long as they are from renewable resources.

At the time of its announcement, the EPA said, "Expanding the use of renewable fuels can help clean up the air, cut dependence on foreign oil, create investment and jobs in America, reduce primary energy use by 20 percent or more as compared to nonrenewable oxygenates, and lower emissions of harmful greenhouse gases."

That is still one of the clearest and most succinct statements I have seen in support of the renewable oxygenate rule, and that is from EPA.

Lately, we have been subjected to a barrage of assertions seeking to deny the environmental and energy benefits of ethanol and ETBE under the renewable oxygenate rule. We knew that would happen because powerful interests have a lot at stake in trying to keep the entire reformulated gasoline market for MTBE, derived from methanol and produced almost exclusively from nonrenewable resources.

Without the renewable oxygenate rule, it is clear that the reformulated gasoline market would be monopolized by MTBE. So I

believe it is time to bring some balance to this issue and to clear up some of the smog and misrepresentations and misinformation that have been spread around about ethanol, ETBE, and the renewable oxygenate rule.

When we look at the facts, it is clear that the renewable oxygenate rule does further our Nation's critical environmental and energy policies. Since they are renewable, domestically produced fuels, ethanol and ETBE reduce fossil fuel consumption and our dependence on imports of fossil energy. That is not the case with MTBE since imports of MTBE are predicted to increase dramatically in the next few years. The use of ethanol and ETBE under the renewable oxygenate rule is expected to result in less production of greenhouse gases, and particularly with increased use of ETBE, the renewable oxygenate rule will reduce emissions of volatile organic compounds, which are the precursors of smog, below the levels that would occur if only MTBE is used in reformulated gasoline.

I have some charts up here that indicate that.

In addition to the benefits in the near term, the real benefit of the renewable rule is that it will help us make the transition to ETBE in the outyears, and that is going to be critical when VOCs must again be reduced in the year 2000 under the Clean Air Act to reduce smog further.

While the debate has been going on about MTBE versus ethanol, we really need to be looking down the line to the more stringent reformulated gasoline standards that become effective in 2000 and compare ETBE versus MTBE. But there really is no comparison.

ETBE is only half as volatile as MTBE, thus cutting back on the VOC emissions. ETBE has a higher octane rating than MTBE, and ETBE displaces more gasoline than MTBE. When we get to phase two of the reformulated gasoline program in the year 2000, the low volatility of ETBE, as compared to MTBE, will allow it to play a key role in further reducing VOCs.

I am confident that at this hearing we can clear up a lot of the misinformation that is being circulated about ethanol and ETBE. We will see that the renewable oxygenate rule is sound policy on environmental, energy, and economic grounds.

I am pleased that we have a strong panel of witnesses here today to address the complicated and technical questions that are involved in this rule: John McClelland, Dr. McClelland, from USDA's Office of Energy; Mr. Richard Wilson, Director of the Office of Mobile Sources at EPA; and Michael Graboski, Dr. Graboski, the director of the Colorado Institute for Fuels and High Altitude Engine Research.

The Department of Energy was invited to attend and to testify, but was unable to provide anyone for today's hearing.

Before I turn to my Colleagues for their opening statements, I thought it never hurts to have a little Chemistry 101 and a little show and tell and a little demonstration. I am going to go off of my prepared testimony. I am sick and tired of the kind of misinformation and misrepresentations that have come out about ethanol and methanol, and I thought a little demonstration here for the press and others assembled might clear this up.



I have one glass here labeled "methanol." It is empty. I have a glass here labeled "ethanol," and it is empty. I have a jar here with some methanol in it.

Let's add a little methanol in that glass. This is a jar of ethanol. I will put a little ethanol in the ethanol glass.

Senator GRASSLEY. Is methanol a controlled substance?

[Laughter.]

Senator HARKIN. Yes, it is. I am going to get to that.

What I would like to do is I would like to challenge all of those who want to support methanol to have a drink. Those of us who support ethanol, we do not mind having a drink of this.

[Senator Harkin drinks from glass of ethanol.]

[Laughter.]

Senator GRASSLEY. You do not care if us Baptists do not participate?

[Laughter.]

Senator WELLSTONE. Say, Chuck, Mr. Chairman, you do not care if we have an ecumenical nonparticipation. Jews will stay out of it, too.

Senator HARKIN. I wanted to do that because I wanted to show that ethanol is pure. It is grain alcohol. You can drink it. It does not hurt you.

Let me read from the can that the methanol came in. There is a reason that no one will drink that: because it is a poison. Let me just read from the label.

"Methanol. Danger, poison. May be fatal or cause blindness if swallowed. Skin and eye irritant. Keep away from heat or flame. Cannot be made nonpoisonous." That is methanol—a deadly poison.

Then, there is ethanol. We got it at Schneider's Liquor Store.

[Laughter.]

Senator HARKIN. Grain alcohol. Fifteen bucks a bottle. It does say it is flammable, so you have to look out. But other than that, you can mix it with whatever you want. You would not want to drink it straight, but you can drink it. It is not a poison.

Here we asked to get some MTBE, and this is how it was sent to us. It comes carefully packed inside a metal container. Here is MTBE. Also highly toxic, highly poisonous.

If anybody would want to take a drink of that, they would be even more foolish, much more. If anybody ever—do you want to smell a little methanol of this, Dick?

Senator LUGAR. No.

Senator GRASSLEY. I have to go back to Iowa today.

Senator HARKIN. Well, I tell you, I spilled a little methanol on my hands before I came over here, and I have been trying to wash it off ever since. But I think that graphically shows the difference.

Here is methanol, a poison. Here is ethanol; you can drink it. I rest my case.

I will yield to my Colleague, Senator Daschle. Would you like to have a little ethanol to spruce up your day?

Senator DASCHLE. Mr. Chairman, I just hope those labels were right.

[Laughter.]

Senator DASCHLE. I am here to take over just in case they were not.

[Laughter.]

# **STATEMENT OF HON. THOMAS A. DASCHLE, A U.S. SENATOR FROM SOUTH DAKOTA**

Senator DASCHLE. I am not sure anyone can follow that act, but I will give it my best shot. I commend the Chairman for graphically demonstrating the point, and while there may be a little humor in it, the fact is that there is more truth than humor. The issue is clean air, clean water, renewable resources. That is the issue. However, if ever we are going to get to a point where we can depend upon fuels that do not kill us as we use them, this is our opportunity.

One fuel we can drink. One fuel we have to use all kinds of precautions that take an entire label to list so as not to be poisoned as we use them.

The renewable regulation was proposed, as everyone here knows, last December, and as the Chairman so ably pointed out, a number of misconceptions about the effects of this regulation have arisen. The issue has been thoroughly debated in the press, in articles, in editorials, and in paid advertisements. Yet, it seems these efforts have produced more heat than light. If we do anything at this hearing, I hope it will be to set the record straight.

In 1990, Congress established the reformulated gasoline program, and its purpose was very clear. Its purpose was to control ozone pollution and reduce emissions of the toxic chemicals that are normally found in gasoline. As the authors of the legislation, Senator Harkin and Senator Dole and I felt that renewable oxygenated fuels like ethanol, like ethyl tertiary butyl ether, or ETBE, and including renewable methanol and methyl tertiary butyl ether, could play a role in reducing air pollution in our major cities. Could play a large role in reducing air pollution. We believe that environmental policy was good economic policy, and we believe that today.

At the time we were careful to declare that all fuels should be able to play a role in the reformulated gasoline program. All fuels, not just ethanol. We recognized that competition among all fuels was healthy for the marketplace.

Unfortunately, as is often the case with energy options, non-renewable fuels have gained an economic advantage through decades of subsidization that today effectively precludes renewable fuels from playing the kind of role that we know they can.

Hence, to allow all fuels to play a role, as was intended by Congress, it has become necessary to establish a modest requirement for the use of renewables. This requirement does not discriminate between methanol-derived fuels or ethanol-derived fuels or any other renewable fuel that may be developed in the future. It merely ensures that all fuels, including renewable fuels, play that role.

One of the primary economic and national security issues that confronted this country as late as 1990, as it does now, is our debilitating dependence upon imports of foreign sources of energy.

There is no question this country is suffering economically from increasing dependence upon foreign energy sources. Every dollar that is sent abroad is one less dollar available to put someone to work in America.

As we prepared to inaugurate the reformulated gasoline program, we have an opportunity to take a small but, in my view, an extraordinarily significant step toward energy independence.

As we all know, America depends heavily on imported energy. As we stand on the verge of implementing the reformulated gasoline program, imports of nonrenewable MTBE—the chief alternative to renewable ethanol and ETBE—are actually rising. Domestic methanol and MTBE producers are having difficulty competing with foreign sources.

In fact, more MTBE capacity is being sited in the Persian Gulf than anywhere in the world. It is instructive that we have just seen a nearly tenfold growth in MTBE imports in the last 4 years. DeWitt and Company, a Houston-based oil industry analyst, recently stated in an MTBE newsletter—and I quote: "There will not be enough domestically produced MTBE available next year to satisfy the demand created by the reformulated gasoline program. We will have to import increased quantities of MTBE . . . the exact volume depends upon how much ethanol is used in the reformulated gasoline program. Best estimates are now that MTBE imports will have to double or perhaps triple in the 1995–1996 time period."

Keep in mind, this was the MTBE newsletter. This was the DeWitt and Company, a Houston-based oil industry analyst, saying this, not some ethanol advocate.

Clearly, our growing dependence upon foreign energy supplies is worthy of our active attention and concern. In the past, the invisible hand of the market has not done a particularly good job of shaping our Nation's energy policy. Where the market fails to achieve effectively legitimate policy objectives, it is incumbent upon a responsible policy to take affirmative steps to meet those objectives.

The market would never have established the Social Security system or the minimum wage or the public school system. Responsible governments at all levels in the past have recognized legitimate social and economic needs and reacted with mandates—mandates that have all made our lives better. Yet, this year we have heard charges that EPA's attempt to choose a winner in the RFG arena is somehow troubling.

What EPA has attempted to accomplish with this rule is not troubling at all. In fact, the time for America to take firm charge of its energy policy is long overdue. Allowing the market to decide winners and losers in this Nation's energy use has left us with a debilitating dependence on imported fossil fuels.

Ironically, many of the critics who charge that government should not meddle in the oxygenate market also support the existing tax breaks for the oil and gas industry. Apparently, they do not seem to find the market a particularly satisfactory judge of

energy future. In 1994, we find ourselves actively discussing proposals to give the domestic oil and gas industry even additional tax incentives.

So it is instructive to note that the market would never have chosen to establish the reformulated gasoline program. That program, which even the oil companies today agree is "the most economical alternative fuel of the future . . . [and] will assist in cleaning the air for those areas of the country with severe smog problems by reducing certain hydrocarbon emissions from vehicles," would not exist were it not for a legislative mandate. That much we know.

The market did not establish the RFG program. Congress did. Congress recognized its virtues and mandated it with the 1990 Clean Air Act Amendments.

Reducing foreign imports, creating investment and jobs in America, reducing fossil energy use, and reducing the Federal deficit strike me as objectives that the market has thus far failed to achieve and which merit considerably more attention by the Federal Government through the mandates it has imposed.

That which we do today, will lay the groundwork for the future, when requirements for making reformulated gasoline will get even tougher.

Gasoline sold after the year 2000 will need to be cleaner, as the Chairman indicated. The low vapor pressure and high octane of ETBE will make it ideal for producing this gasoline. Moreover, because the production of ETBE uses substantial quantities of natural gas, the renewable oxygenate requirement will provide considerable benefits to the domestic natural gas industry.

Today America stands at a crossroads. We can do nothing and allow ourselves to continue to slip into dependence on nonrenewable foreign supplies of MTBE. That would be easy. Inaction and inertia will lead us down that path. I guarantee it.

But we have a choice. We can take steps today to lead the country away from economically crippling dependence on foreign sources. The renewable oxygenate requirement is a small but significant step toward energy independence and clean air fueled with American-made ethanol and ETBE.

Thank you, Mr. Chairman.

Senator HARKIN. Thank you, Senator Daschle, for a very profound and very clear statement, especially when you noted the tax benefits and how the oil companies have been getting them for years, and yet they are screaming about establishing our domestically-produced fuels market, perhaps with a little bit of Government assistance. That is an excellent point.

I would like to recognize my Colleague, the Distinguished Senator from Iowa, Senator Grassley.

[Testimony resumes on page 8.]

[The prepared statement of Senator Daschle follows.]

#### STATEMENT OF SENATOR THOMAS A. DASCHLE

Since the renewable oxygenate regulation was proposed last December, a number of misconceptions about its effects have arisen. This issue has been thoroughly debated in the press, in articles, in editorials, and in paid advertisements. Unfortunately, these efforts seem to have produced more heat than light. It is important to set the record straight.

In 1990, Congress established the reformulated gasoline program. Its purpose is both to control ozone pollution and reduce emissions of the toxic chemicals that are normally found in gasoline. As the authors of the legislation, Senators Harkin, Dole and I felt that renewable oxygenated fuels, such as ethanol and ethyl tertiary butyl ether—and including renewable methanol and methyl tertiary butyl ether—could play a large role in reducing air pollution in our major cities. We believed that good environmental policy and good economic policy could go hand-in-hand.

At that time, we were careful to declare that all fuels should be able to play a role in the reformulated gasoline program. We recognized that competition among all fuels was healthy for the marketplace.

Unfortunately, as is often the case with energy options, nonrenewable fuels have gained an economic advantage through decades of subsidized use that today effectively precludes renewable fuels from playing a significant role.

Hence, to allow all fuels to play a role, as was intended by Congress, it has become necessary to establish a modest requirement for the use of renewables. This requirement does not discriminate between methanol-derived fuels or ethanol-derived fuels or any other renewable fuel that may be developed in the future. It merely ensures that all fuels—including renewable fuels—play a role.

One of the primary economic and national security issues that confronted this Nation in 1990, as it does now, is our debilitating dependence on imports of foreign sources of energy.

There is no question that this country is suffering economically from our increasing dependence on foreign energy sources. Every dollar that is sent abroad is one less dollar available to put someone to work in America.

As we prepare to inaugurate the reformulated gasoline program, we have an opportunity to take a small, but significant step toward energy independence.

As we all know, America depends heavily on imported energy. As we stand on the verge of implementing the reformulating gasoline program, imports of nonrenewable MTBE—the chief alternative to renewable ethanol and ETBE—are rising. Domestic methanol and MTBE producers are having difficulty competing with foreign sources.

In fact, more MTBE capacity is being sited in the Persian Gulf than anywhere in the world. It is instructive that we have seen nearly a ten-fold growth in MTBE imports in just the last 4 years. DeWitt and Company, a Houston-based oil industry analyst, recently stated in an MTBE newsletter:

"there will not be enough domestically produced MTBE available next year to satisfy the demand created by the reformulated gasoline program. We will have to import increased quantities of MTBE . . . the exact volume depends on how much ethanol is used in the reformulated gasoline program. Best estimates are now that MTBE imports will have to double or perhaps triple in the 1995-1996 time period."

Clearly, our growing dependence on foreign energy supplies is worthy of our active attention and concern. In the past, the invisible hand of the market has not done a particularly good job of shaping our Nation's energy policy. Where the market fails to achieve effectively legitimate policy objectives, it is incumbent upon a responsible government to take affirmative steps to meet those objectives.

The market would never have established the Social Security system or the minimum wage or the public school system. Responsible governments at all levels in the past have recognized legitimate social and economic needs and reacted with mandates—mandates that have made all our lives better. Yet, this year we have heard charges that EPA's attempt to choose a winner in the RFG arena is somehow troubling.

What EPA is attempting to accomplish with this rule is not troubling at all. In fact, the time for America to take firm charge of its energy policy is long overdue. Allowing the market to decide winners and losers in this Nation's energy use has left us with a debilitating dependence on imported fossil fuels.

Ironically, many of the critics who charge that government should not meddle in the oxygenate market also support the existing tax breaks for the oil and gas industry. Apparently, they do not seem to find the market a particularly satisfactory judge of energy future. In 1994, we find ourselves actively discussing proposals to give the domestic oil and gas industry additional tax incentives.

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The market didn't establish the RFG program. Congress recognized its virtues and mandated it in the 1990 Clean Air Act Amendments.

Reducing foreign imports, creating investment and jobs in America, reducing fossil energy use and reducing the federal deficit strike me as objectives that the market has thus far failed to achieve and which merit considerably more attention by the federal government.

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### STATEMENT OF HON. CHARLES E. GRASSLEY, A U.S. SENATOR FROM IOWA

Senator GRASSLEY. Thank you, Mr. Chairman. You did a very good job, I think, of clearing up some of the scientific misinformation and misrepresentation, as you have stated it. I want to spend my time talking about the political misinformation and misrepresentation, and I want to refer to both the Bush administration and the Clinton administration. I am not proud of either administration handling it the way that it should be handled.

For this present administration, I have to express astonishment. I have to ask: How in the world is it possible, after all the promises made by President Bill Clinton, President-elect Bill Clinton, Presidential Candidate Bill Clinton, and Governor Bill Clinton, promises that he would far exceed President Bush's treatment of ethanol, treatment both within and outside the Clean Air Reformulated Fuels Program, how it is possible that at still this 11th hour we must continue the struggle to salvage an ethanol program? Is there anyone here who can speak for the Clinton administration? Anyone on the panel who is representing, as a political appointee, the administration?

I know that Senator Harkin said somebody was invited from Energy and they could not come, but I think this is an important enough issue that there should have been somebody here representing the administration's point of view.

President Bush resolved the problem in October 1992, and at that time, farmers were singing his praises. Yet, at the same time, or about the same time, on September 28, 1992, in the *Des Moines Register* there was a headline: "Presidential Candidate Bill Clinton Attacks the Bush Ethanol Plan." Clinton said, and I quote, "Bush gave farmers the shaft." Clinton said that he would do better.

On January 13, 1993, in a letter to Congressman Richard Durbin, President Clinton stated, and I quote, "Our Nation's policy towards ethanol has suffered from a lack of decisiveness in the past years." Mr. Clinton continued by criticizing what he called the on-again, off-again nature of this ethanol policy that has limited ethanol market growth.

Well, talk about the lack of decisiveness. That letter was written almost a year-and-a-half ago, and President Clinton has ethanol still dangling.

I remember how long it took President Bush—well over a year—to get a policy out. Also, there were vocal public attacks against President Bush at that time—and I think that they were the right attacks—by a lot of the people that are here today. My Democratic Colleagues and my allies over a long period of time in this ethanol fight remember. It was a Harkin-Daschle-Grassley-Dole amendment—bipartisan—that got this to be part of the Clean Air bill.

I remember our Distinguished Chairman, my Colleague from Iowa, Senator Harkin, in October 1992 talking about the solution then announced by President Bush, and rightly so, and saying that the delays at that time, just months and months of delays, were hurting ethanol. The Associated Press reported Senator Harkin that he “claimed that uncertainty about ethanol’s future had allowed producers of methanol and other alternative fuels to pull ahead.” That is a very important fact, and all the time while the ethanol industry was curtailing expansion.

Senator Harkin, you were right. Uncertainty hurts ethanol and allows the petroleum and gas industry to increase their fuel energy monopoly. President-elect Clinton was right in the letter to Congressman Durbin about the lack of decisiveness and the problems of the on-again, off-again Bush ethanol policy.

But in the words then of our present President, when will his actions match his words? In the face of big oil’s very nonstop, very deafening drumbeat of bogus anti-ethanol propaganda—and Senator Harkin I think has pointed that out very well in this demonstration. In the fact of big oil’s deafening drumbeat, I wrote President Clinton 2 weeks ago asking him to move EPA to the final rule process immediately and, more importantly, for him to keep his promises. He has not kept his promises yet.

I do not envy my Senate Democratic Colleagues. You have relied upon President Clinton’s assurances. You went out on the limb for Candidate Clinton on this ethanol issue. His promises led you to publicly attack the Bush proposal and to praise the Clinton proposal even though it came over a year later. Based upon Clinton’s ethanol promises, my Colleagues have assured their constituents, the thousands upon thousands of farm families and blue-collar ethanol workers, that Clinton could do better, that Clinton would include ethanol in the reformulated gasoline program. But look what has happened instead.

Look what President Clinton has done to ethanol. The administration threw out the Bush solution. Then Clinton supported an ethanol tax, and now President Clinton gives us what amounts to an MTBE mandate for the reformulated gasoline program. He throws ethanol out into a vulnerable lifeboat that he calls renewable oxygenate standard. He had to know that by doing this, with this very side proposal, that the whole proposal would be vulnerable to the public attacks and particularly the public attack campaign of big oil. It would also be vulnerable to EPA’s anti-ethanol bias and regulatory process, and it would be vulnerable to eventually—and I will still bet we have one of these—big oil’s court challenge.

President Clinton could have made certain that ethanol was part of an RFG, not outside of it. My statement to EPA on January 14, this year stated that had ethanol and MTBE been kept in the same boat, then if ethanol would sink, so would the multibillion-dollar oil company investment in MTBE. Big oil would not have dared to fight an RFG that included ethanol, and MTBE would then be on an even footing.

So, you know, if one went down, they all went down. Big oil would not put themselves into that boat. Big oil would have too much to lose. No one should be fooled if President Clinton cuts back on the ethanol side agreement. No one should be fooled if the Clinton plan allows big oil to easily kill ethanol in the courts.

I want to submit for today's record my statement before EPA as well as my detailed statement<sup>1</sup> of my Senate Colleagues delivered November 20, 1993. Additionally, I want to submit for today's record a copy of my May 12, 1994, letter to President Clinton, and included I have a press statement, a letter to Senator Johnston requesting these materials be included in his hearing that he had on May 12, and also an indepth study<sup>2</sup> exposing the billions upon billions of oil industry subsidies.

[The prepared statement of Senator Grassley follows.]

#### STATEMENT OF SENATOR CHARLES E. GRASSLEY

Mr. Chairman, Members of the committee, I have to express astonishment.

I have to ask, How in the world is it possible after all the promises made by President Bill Clinton, by presidential candidate Bill Clinton and by Governor Bill Clinton, promises to far exceed President Bush's treatment of ethanol treatment both within and outside of the Clean Air Reformulated Gasoline Program? How is it possible that at this 11th hour we must continue the struggle to salvage the fight for ethanol? Is there anyone here who can speak for President Clinton? Anyone one on the panel? Why isn't the Clinton administration here?

President Bush resolved this problem in October 1992. Farmers were singing his praises. But quoted in the September 28, 1992, *Des Moines Register* headline, presidential candidate Bill Clinton attacked the Bush ethanol plan. Clinton said, and I quote, "... Bush gave farmers 'the shaft.'" Clinton said he would do better.

In a January 13, 1993, letter to Congressman Richard Durbin, Clinton stated, and I quote, "Our Nation's policy towards ethanol has suffered from a lack of decisiveness in past years."

Mr. Clinton continued by criticizing the "on-again, off-again" nature of this ethanol policy that has limited ethanol market growth. Talk about "lack of decisiveness!" That letter was written almost a year and a-half ago, and Clinton has ethanol still dangling!

I remember the vocal, public attacks against President Bush by my Democrat Colleagues and allies in this ethanol fight. I remember my Iowa Colleague, Senator Harkin, attacking the October, 1992, solution announced by President Bush. He said the delays hurt ethanol.

Associated Press reported Senator Harkin "claimed that uncertainty about ethanol's future had allowed producers of methanol and other alternative fuels to pull ahead," while the ethanol industry curtailed expansion.

Senator Harkin was right. Uncertainty hurts ethanol and allows the petroleum and gas industry to increase their fuel energy monopoly. President Clinton was right about the "lack of decisiveness" and the problems of an "on again, off-again" ethanol policy.

But when will the President's action match his words? In the face of Big Oil's non-stop, deafening drumbeat of bogus anti-ethanol propaganda, I wrote President Clinton 2 weeks ago asking him to move EPA to a final rule immediately, and more important, for him to keep his promises. He hasn't done it yet. I don't envy my Senate Democrat friends. You have relied upon President Clinton's assurances. You

<sup>1</sup> Retained in the Committee's file.

<sup>2</sup> Ibid.



went out on the limb for him on ethanol. His promises led you to publicly attack the Bush proposal and to praise the Clinton proposal even though it came over a year later.

Based upon Clinton's ethanol promises, you have assured your constituents the thousands upon thousands of farm families and blue-collar ethanol workers that Clinton would do better. That Clinton would include ethanol in the Reformulated Gasoline Program. But look what has happened instead. Look what Clinton has done to ethanol.

The Clinton administration threw out the Bush solution, then Clinton supported an ethanol tax and now President Clinton gives us what amounts to an MTBE mandate for the Reformulated Gasoline Program. He throws ethanol out into a vulnerable life boat he calls the Renewable Oxygenate Standard. He had to know that his side proposal would be vulnerable to the public attack campaign by big oil, vulnerable to EPA's anti-ethanol bias and regulatory process, and vulnerable to a big oil court challenge.

Clinton could have made certain that ethanol was PART of the RFG, not outside of it!

My testimony to EPA on January 14, 1994, stated that had ethanol and MTBE been kept in the same "boat," if ethanol sank, so would the multimillion-dollar oil company investments in MTBE. Big oil would not have dared to fight an RFG that included ethanol and MTBE on even footing. They have too much to lose. No one should be fooled if Clinton cuts back on this ethanol side agreement. No one should be fooled if the Clinton plan allows big oil to easily kill ethanol in the courts.

I want to submit for today's record my statement before EPA, as well as my detailed statement to my Senate Colleagues delivered on November 20, 1993. I also want to submit for today's record a copy of my May 12, 1994, letter to President Clinton. Included is my press statement, a letter to Senator Johnston requesting these materials be included in the Senate Energy Committee's hearing record of May 12, and an indepth study exposing the billions upon billions of oil industry subsidies. The time for action is long past due.

Unfortunately, those who can make it happen, the members of Clinton administration, are not here today. I don't envy the position my Democrat Colleagues find themselves out on the limb, fighting desperately to make their President keep his promises.

I remember in September 1992, my good Colleague from Nebraska, Senator Kerrey attacking President Bush for his indecision on ethanol, and that, and I quote, "After three swings and a miss on ethanol, George Bush is out and should be retired." end of quote. President Bush was retired, but President Clinton's "ethanol bat" is waving and swinging so erratically, we don't know if he's trying to hit balls or swat flies.

I learned a long time ago, during the years of Republican Administrations, that no matter how unpleasant it gets, sometimes you have to stand up to your party's President call a spade, a spade, and openly attack when necessary.

My Democrat Colleagues need to remember this: You owe *nothing* to President Clinton; You owe *everything* to your *constituents*! Make your president keep his promises. Don't let him erode ethanol's position any further. Don't let him water down this side agreement. No phase in. No reductions. If anything, make him INCREASE ethanol's market share. The time for action is long over due.

Senator GRASSLEY. But let it not be mistaken. I think the time for action is long overdue. Unfortunately, those who can make it happen, the members of the Clinton administration, are not here today. I do not envy the position of my Colleagues on the other side of the aisle because, to some extent, like I felt I was all through the summer of 1992 out on a limb, I think they are out on a limb, fighting desperately to make their President keep his promises.

I remember in September 1992 my good Colleague from Nebraska, Senator Kerrey, attacking President Bush for his indecision on ethanol, and there was indecision on ethanol. In regard to that, I quote Senator Kerrey: "After three swings and a miss on ethanol, George Bush is out and should be retired."

Well, President Bush was retired. But President Clinton's ethanol bat is waving and swinging so erratically that we do not know if he is trying to hit balls or swat flies. I learned a long time ago

during years of Republican administrations that no matter how unpleasant it gets, sometimes you have to stand up to your party's President, call a spade a spade, and openly attack when necessary.

My Democratic Colleagues need to remember this, that you owe *nothing* to President Clinton, you owe *everything* to your constituents. Make your President keep his promise. Do not let him erode ethanol's position any further. Do not let him water down the side agreement or have some sort of a phase-in or something less than 30 percent. There can be no phase-ins and no reductions. If anything, make him increase ethanol's market share.

The time for action is long overdue, going way back to our passage of this in 1991 and months and months of procrastination even on the part of President Bush.

I yield the floor.

Senator HARKIN. My Colleague from Nebraska, Senator Jim Exon.

### STATEMENT OF HON. J. JAMES EXON, A U.S. SENATOR FROM NEBRASKA

Senator EXON. Mr. Chairman, thank you very much. I congratulate you for calling this hearing today. We had to do something with the one-sided hearing that was held 10 days or so ago by the Energy Committee.

I am deeply disappointed at the fact that the Energy Department of the Clinton administration could not see fit to be here today. That tells me something; that gives me some concern. Since I have some contacts within that Department, I will pursue that to see where they are coming from.

I have listened with great interest to the statements that have been made by my Colleagues and the demonstration put on by my friend and Colleague from Iowa. I think that sums it up very, very well from the standpoint of where we are going and where we are trying to get.

I have listened with great interest to my good friend and Colleague from Iowa, Senator Grassley. Senator Grassley, as far as I know, as of now, the President of the United States, President Clinton, has not backed away and is not backing away. That is all of the information that I have. I would say to my friend from Iowa—he and I have worked together on many, many things on many, many occasions. If the President of the United States backs away, which I do not think he will, then I would join you and assure you that not only this Senator but my Colleague, Senator Kerrey from Nebraska, will be just as forthright as we have been in the past in criticizing the actions of people backing away from their commitments.

I do get the feeling today that an all-out push is on, and, therefore, I think this hearing on a bipartisan basis is tremendously important.

I would echo the words said so eloquently by our friend from South Dakota. Senator Daschle said the issue is clean air and clean water and clean fuel—a dual, parallel issue. Unfortunately, that clouds the clean air, clean water, and clean fuel; the statement that you made is the unfortunate and clouding issue of big oil—big oil and in cooperation with the big environmentalists.

There are people on this committee and others that have been somewhat fearful of not tying in the environmentalist group with big oil. But I simply say here today that the combination of big oil and the big environmentalist is a strange and unholy alliance, indeed. I would simply say to the environmentalists that I have been with from time to time, I think you are traveling on pretty dangerous water. I think you do not know what you do. If the environmental community wants to continue to remain in the hip pocket of big oil, then maybe their vast public relations as do-gooders might be clouded by some of the smut and clouds and smoke that have come out of the all-out attack on the ethanol proposals.

I simply say that I am not particularly surprised at the self-serving, selfish actions of big oil. The issue here, as I said in the last hearing in front of the Energy Committee, the subject is money, m-o-n-e-y. Certainly the big oil companies have lots of that. I continue to be astonished at the environmental groups that I point the double-barreled shotgun at. I am not afraid to take on the environmentalists, although I have been with them from time to time. They are, in my opinion, as irresponsible as is big oil on trying to tell the truth about this issue.

For the sake of time, I will not, Mr. Chairman, go into many of the statements, the excellent statements that have been made and repeated oft by those of us, granted, from agricultural States where m-o-n-e-y would be helpful to our agricultural interests. But way back as Governor of Nebraska, you know, almost 20 years ago, when the first big push on ethanol in the form of gasohol—that was our phrase in Nebraska. When gasohol first came about, it was immediately attacked by big oil. It was supported by the environmental groups. Evidently, we have never expected to win over big oil. We expected to have the continued support of the environmental groups. That seemed to be lacking. Inasmuch as I want to send a message to big oil—and I have seen that frequently in the past—I would like to send the message as one Senator that I am astonished at the lack of understanding of the environmental groups on this issue. I also put them in the same boat as big oil on this particular issue.

I think it has been said over and over again, and I admit that is in the economic interest of those of us in agricultural States, but the overriding issue has been said here by the previous opening remarks; that is, it far exceeds just the interest of the agricultural States of these United States. It gets down to the matter of whether or not we are going to take this tiny step towards eliminating the dependence of foreign oil that is well over 50 percent of our total usage today and going up faster than it ever has previously.

I simply say that this hearing today I hope will shed some light. I am disappointed that the Department of Energy is not here, but they traditionally have been closer to big oil than they have to ethanol or gasohol—call it what you will. We will continue to fight, and I wish to thank Senator Grassley for his statement and simply say to him, my friend and Colleague, that there will be—I assure him none of us on the Democratic side of the aisle will take any different position whatsoever with regard to any step backward from the courageous step that President Clinton has taken, if that has changed somewhere during all of the pressures from big oil and

from the professional do-gooders that call themselves environmentalists.

Mr. Chairman, thank you very much.

Senator HARKIN. Thank you, Senator Exon.

Senator Lugar?

**STATEMENT OF HON. RICHARD G. LUGAR, U.S. A SENATOR  
FROM INDIANA**

Senator LUGAR. Thank you very much, Mr. Chairman. I come with good will, really, for all the administrations that have been involved over the course of time because this issue is one that our committee has dealt with for the entirety of my tenure in the Senate.

I come as an advocate for constituents who are producing ethanol, New Energy in South Bend, and have been doing so since that plant was opened in 1982. That plant uses 20 million bushels of corn from seven Indiana counties that surround it, and I suspect is living proof, at least, of the efficiencies of ethanol and the markets that are there, many of them in my home State but also in adjoining States through the Farm Bureau co-ops.

Our specific problem, of course, comes from the 1990 Clean Air Act amendments which charged the EPA with formulating regulations specifying performance standards for reformulated gasoline and baseline emission levels for volatile organic compounds and air toxics. That was bound to create another battle of sorts, and it did. As my Colleague from Iowa, Senator Grassley, has pointed out, the Bush administration wrestled with those regulations and did not come to a conclusion. The Clinton administration has done so.

I recall and pay tribute to Ms. Browner, the Administrator of EPA, for sending over to the Senate—I can recall a hearing, an informal hearing last November, in which four officials of EPA tried to listen to a number of Members of the Senate and the House and their staffs and various other people who were producing ethanol to understand the basis both of our hopes and our concerns. They came up with a compromise that we are discussing today; namely, a proposal that on an annual basis 30 percent of the oxygenates used in the reformulated gasoline be obtained from renewable feed stocks—that is, ethanol—as opposed to methanol—derived.

Now, that is the proposal, and to the best of my knowledge—and perhaps witnesses may give us further enlightenment today—that rule is moving ahead toward enactment in mid-June. Now, I congratulate the Chairman for at least a cautious move and one that offers us an opportunity for more education in addition this morning, because the Energy Committee hearing did present a very strong point of view, which most of us had heard before, but at the same time EPA has heard it before and as far as I can tell is staying the course toward the 30-percent reformulation situation.

That is not everybody's idea of how it should have come out. It is, at best, a compromise, a competing interest, but one that clearly moves toward the Clean Air Act standards, and does so, I would say unapologetically, with the thought that this will utilize, if enacted, to our understanding, about 400 million bushels of corn in addition to the 400 million, roughly, that are now being utilized in plants like New Energy in South Bend and elsewhere.

That is of considerable consequent not only to corn farmers but to many States, including my own, but many States in this Union that are held together by the agricultural industry. That was a part of Ms. Browner's formulation. It was very candidly a part of it that rural America and the fabric of what is occurring there ought to be a consideration, even as we were taking a look at the very technical aspects of the Clean Air Act. Those of us on this committee who have taken a look frequently at agricultural economic development in the hinterland of our country are very grateful that that was a criterion and an interest of this administration.

So I come with confidence that the administration and President Clinton and the EPA people and Ms. Browner are moving ahead toward enactment of this rule. But I look for assurance, and I am sure the Chairman does, and this is one reason for having this meeting in a very strong, bipartisan sense this morning.

Thank you.

Senator HARKIN. Thank you very much, Senator Lugar.

Senator Wellstone?

#### **STATEMENT OF HON. PAUL D. WELLSTONE, A U.S. SENATOR FROM MINNESOTA**

Senator WELLSTONE. Thank you, Mr. Chairman. I will be very brief so we can get going. I would thank Dr. McClelland and Mr. Wilson and Dr. Graboski for being here today.

I wanted to say to my Colleague from Nebraska that, as a big environmentalist, I am very proud to be here with my Colleagues supporting the proposed rule of the Environmental Protection Agency, which I am confident will be the final rule. The interesting thing to me has been actually I think many in the environmental community have been supportive. Some have not, but there is also, I think, a significant and important amount of support from the environmental community, as there should be.

Mr. Chairman, I cannot really add to what has been said already. I just want to put this in somewhat personal terms. When John McClelland and Dick Wilson came out to Minnesota, to Marshall, Minnesota, southwest Minnesota, and we were talking about a farmers' cooperative—very, very important what has been done with our processing plant—it was the first time—and maybe that is what draws all of us here together, Democrats and Republicans. It was the first time in several years that I have seen so much excitement, people so positive that something good was about to happen in rural America. I really think that that is at least in part what this is about, but that is not all that this is about.

It seems to me that we have got a couple of competing visions for the future that we are dealing with. On the one hand—it is a little bit like "Fiddler on the Roof." On the one hand, you do have an oil industry that has never surrendered its privilege gracefully, which is talking about all the debilitating effects of this, the sky will fall in, just as the oil industry talked about what we would do when we removed lead from gasoline. The same kind of dire warnings without foundation. Just as they said about the reformulated gasoline program, actually.

On the other hand, you have a broad section of the population, maybe not with the same kind of economic wherewithal and clout,

which is saying this is a renewable resource. It has to do with energy policy. This has to do with clean air, as my Colleague from South Dakota said. It has to do with rural economic development.

It has a lot, Mr. Chairman, to do with kind of where we go as a Nation, and I really think this is above and beyond just a rural issue or an agriculture issue. It is a crossroads kind of decision that is going to be made.

I am very confident, I would say to Senator Grassley from Iowa, I am very confident that we will get a good final ruling. I have seen no indication to the contrary. I think the evidence is on our side, and that is what we are going to get on the record today. I think good public policy is on our side, and I think the commitment of the President of the United States of America to move in this direction is on our side.

Thank you.

Senator LUGAR. Mr. Chairman, may I ask that a statement by Senator Wallop be inserted in the record at this point.

Senator HARKIN. Certainly. Without objection, it will be done.

[The prepared statement of Senator Wallop follows.]

#### STATEMENT OF SENATOR MALCOLM WALLOP

Thank you Mr. Chairman for the opportunity to submit a statement at this hearing on EPA's reformulated gasoline program and its proposed renewable oxygenates mandate.

When the Environmental Protection Agency completed its regulatory negotiation on reformulated gasoline last fall many of us were relieved. Fuel neutrality was preserved. Certainty was achieved. Finally, this long awaited Federal program could be launched. But, before the ink was dry on the agreement, EPA issued its supplementary rule regarding renewable oxygenates, and the debate resumed on the merits of different oxygenates to achieve the same environmental objectives for the reformulated gasoline program.

Uncertainty returned to the process. Fuel neutrality once again became an issue. Thus, when the Energy and Natural Resources held its hearing on May 12, I was interested in hearing the administration's justification for EPA's proposed rule. However, the justification was not forthcoming.

Fifty-one Members of the Senate, and over 100 Members of the House, share my concerns and have communicated them to EPA Administrator Browner. When the Energy and Natural Resources Committee conducted its May 12 hearing, not only had EPA brushed off our concerns, but the letters signed by 51 Senators in opposition to the mandate and the letters from Representatives Dingell, Brooks, Mineta, Wyden, Dickey and Hoyer were not included in the docket. However, letters supporting EPA proposal were included in the docket; for example, letters from Representative Durbin and Senator Mosely-Braun and others. I was assured by EPA Assistant Administrator Mary Nichols that this situation would be corrected, and I ask that our letter be included in this hearing record, as well.

Among our concerns are that, based on analyses by its own staff, the EPA does not have statutory authority under the Clean Air Act to mandate the use of specific oxygenates, such as renewable oxygenates; attempts to authorize an ethanol mandate was soundly rejected during Congressional debate on the 1990 Amendments and fuel neutrality was a condition imposed on the regulatory negotiations that followed.

Moreover, even if the EPA had the authority, the environmental benefits claimed by the EPA lack scientific foundation. Assistant Administrator Nichols admitted at the Energy and Natural Resources Committee's hearing that EPA is not claiming any air quality benefits as a result of the proposal. The EPA expects the urban air quality benefits to be exactly the same. However, the mandate could adversely affect urban air quality as well as contribute to increased greenhouse gas emissions. Consequently, it is being opposed by numerous State air pollution control officials and environmental organizations—some of whom are represented here today.

EPA Assistant Administrator Nichols admitted to the Energy and Natural Resources Committee that what EPA is trying to do is assure that oxygenates which

are based on renewable resources have a substantial share of the reformulated gasoline market. She also expressed the EPA's belief that this renewable oxygenate mandate will assure diversity of oxygenates in the market.

The EPA also justifies the rule on grounds that it would improve our energy security. However, numerous analyses forecast increases in oil imports. Although nominal, under the proposal the trend is in the wrong direction. These conclusions are supported by numerous analyses, including those by the EPA's own staff, the Department of Energy and others. (I ask that a bibliography of these analyses be included in this record.) I have been assured by Assistant Administrator Nichols that they will be included in its docket on the renewable oxygenate proposal, as well.

The ethanol fuel industry was created in the late 1970's out of the largesse of the American people. During the last 15 years, there have been 17 attempts by special interests to carve out a guaranteed market for ethanol. Now ethanol producers are perhaps the United States' most heavily subsidized industry. The annual taxpayer subsidy is \$550-million-per-year. According to Transportation Secretary Pena's February 14, letter, this proposed mandate would result in an additional loss to the Highway Trust Fund of from \$340 to \$465 million.

Ultimately, the marketplace must determine what combination of fuels and vehicles will meet the needs of American consumers consistent with national energy and environmental laws. Therefore, I am deeply disturbed by efforts by the White House to abandoned the fuel neutrality that was contained in the 1990 Clean Air Act Amendments and the 1992 Energy Policy Act. Such attempts to bias energy and environmental policies in favor of certain special interests jeopardize the long-term success of both national energy and environmental policies.

The beneficiaries of this mandate are not going to be American farmers who produce the corn. At best, we will experience a nominal increase in corn production or prices. The beneficiaries are going to be the industrial interests that process the corn into ethanol and its derivatives. Under the mandate, current production of ethanol is going to be diverted to its higher valued oxygenates.

Already these special interests benefit from a market made possible by Federal tax subsidies. Now, the producers of ethanol from corn want not only guaranteed access to the oxygenate market, but they intend to use an additional \$340 million in further tax subsidies to achieve their ends.

Moreover, according to Prudential Securities, this raid on the Federal Treasury is being orchestrated at the White House by Chief of Staff Thomas McLarty and Senior Adviser Bruce Lindsey to satisfy a campaign promise—not to satisfy national environmental objectives.

As industry and environmental witnesses before the Energy and Natural Resources Committee observed, the proposed renewable oxygenate mandate lacks authority and violates the reg-neg process. It also is inconsistent with President Clinton's Executive Order that Federal agencies should only promulgate regulations that are required by law, are necessary to interpret the law, or are made necessary by compelling public need. The renewable oxygenate mandate fails to meet these tests, as well.

We must not lose sight of the fact that this proposed mandate would affect one-third of the gasoline used in the United States. Even if it satisfied the criteria proposed by the EPA, which it does not, adoption of the mandate at this late hour would violate fuel neutrality as well as jeopardize the orderly introduction of reformulated gasoline into the marketplace.

The law requires that adequate supplies of reformulated gasoline be available before January 1995 to meet the needs of critical ozone nonattainment areas. This is now unlikely. It is incumbent on the Clinton administration to now do something to correct the situation.

Thank you, Mr. Chairman.

Senator HARKIN. Before we turn to our witnesses, I want to review the process which we have gone through here, so we understand how we have gotten to the point where we are.

The Clean Air Act, I remember the debate—we all do, I am sure—on the floor of the Senate in 1990. The Clean Air Act was passed, I believe signed into law, if I am not mistaken, in September 1990. Am I about right?

Mr. WILSON. November, Sir.

Senator HARKIN. November of 1990 it was signed into law, having the provision that Senator Grassley and I and Senators Daschle

and Dole all worked on to get in there on oxygenated fuel, the 2-percent rule.

We then, I think in a very strong, bipartisan fashion, tried to get the Bush administration to issue a rule during the 1991 period. That did not happen. It did not happen in 1992. In September of 1992, in Indianola, Iowa, as a matter of fact, then-Candidate Clinton gave a speech, and in that speech said that he was dissatisfied with the progress that the Bush administration had made on ethanol and that he was going to be much stronger on it and that ethanol would, indeed, play a role in the reformulated gasoline market.

In October, then-President Bush, also a candidate at that time, issued a proposal. He did not issue a rule at that time, never proposed a rule, but proposed that there be a 1-pound waiver on the volatility for ethanol blends.

But serious concerns later arose about whether their proposal was workable and whether it violated the earlier negotiated rule-making process regarding the RFG program.

Then the election was held, and President Clinton came into office. We now have a new administration. Again, in a bipartisan fashion, we all started pushing on then-President Clinton to follow up on his commitment that he made in September of 1992. So during the year of 1993, many communications, both verbal and written, went back and forth between, I am sure, everybody here and the Clinton administration.

During that period of time, with a new administration, and new people coming in and taking over, they looked at the 1-pound waiver proposed by President Bush to see if that would be the way to go, and clearly the legal experts said, no, that would be held illegal if we were to implement the 1-pound waiver.

So then the new proposed rule was published in the FEDERAL REGISTER on December 27, 1993, less than 1 year after President Clinton took over. The first public hearing was on January 14, just a little over 2 weeks later. The close of the comment period was February 14, with the final rule due in June, and I am told it will be promulgated by June 15.

I was told by the Administrator of EPA that, during that comment period, EPA received over 10,000 comments on this proposed rule, more than any rule ever promulgated or proposed by EPA. Under the law, those have to be reviewed, and that process has been ongoing. So we expect the rule will be out on June 15.

I am told—I am not an expert in this, but I am told that is one of the fastest rulemaking procedures ever enacted by the Government. Now, I do not know. I could be wrong on that. I am just told that that is true.

Secondly, I would say that these are administration witnesses who are here. They are part of the administration, and I assume will speak on behalf of the administration and not just as individuals. We have two from the administration, and I can assume—and I will again stand to be corrected by either one of you gentlemen if you are speaking outside of the administration. I hope not.

Again, having said that, I agree with those who have said that we cannot let our guard down. We must continue in a bipartisan fashion to push, not in an unreasonable manner, but to make sure



that we enlighten the people as to what is going on, as both Senator Grassley has said and Senator Lugar and Senator Exon said so eloquently. There is a lot of money involved in this. Obviously, big oil has been fighting this for a long time. They fought us when we were on the floor of the Senate when Senator Daschle introduced his amendment. They were fighting us at that time. Some very powerful forces are at work here, but I am assured that this rule will come out in June.

We wanted to have this hearing to clear the air because I felt and a lot of us felt that there was a lot of misinformation that had come out in previous hearings. Also, there were studies that were done that were not brought up at that time. The USDA study, for example, was not brought up at that other hearing. We felt that before that final rule is published, we should have on the record the results of that study and other studies that may not have been brought up or were not brought up at that time.

I wanted to bring us to this point, how we got here and what the timetable was. So now we will turn to our witnesses.

We have Dr. John McClelland from the U.S. Department of Agriculture, an economist. We will have your statement. I think we will go through all three. We will have Dr. McClelland. Then we will have Mr. Wilson from EPA, and then Dr. Graboski. We will go through their statements, and then we will open it up for questions.

I have your statements. They will be made a part of the record in their entirety, and, Dr. McClelland, welcome and please proceed.

**STATEMENT OF JOHN W. McCLELLAND, AGRICULTURAL ECONOMIST, OFFICE OF ENERGY, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, DC.; ACCOMPANIED BY MICHAEL GRABOSKI, DIRECTOR, COLORADO INSTITUTE FOR FUELS AND HIGH ALTITUDE ENGINE RESEARCH, COLORADO SCHOOL OF MINES, GOLDEN, CO**

Mr. McCLELLAND. Thank you, Mr. Chairman.

Mr. Chairman and Members of the committee, thank you for the opportunity to discuss ethanol and its relationship to agriculture. Today I am accompanied by Dr. Michael Graboski, the director of the Colorado Institute for Fuels and High Altitude Engine Research at the Colorado School of Mines in Golden, Colorado. Dr. Graboski is the principal investigator on a cooperative research agreement between USDA and the Colorado School of Mines. This statement and the supporting documents are submitted to the committee with the request that they be included in the record.

USDA strongly supports EPA's proposed rule for a renewable oxygenate requirement for reformulated gasoline. USDA believes this proposal would provide greater opportunities for ethanol and other renewable oxygenates and, as a result, reduce U.S. energy requirements, lower the level of Government farm program payments, enhance the well-being of farmers and others living in rural America, and improve the environment.

USDA's analysis of the EPA proposal shows that with full implementation of that program, approximately 680 million gallons of ethanol would be required in reformulated gasoline. About 500 million gallons of that ethanol would have to come from new produc-

tion in order for the ethanol industry to maintain the markets that already exist. USDA believes that this new production can be added to existing capacity by early or mid-1995.

I would like to address some of the issues concerning the energy requirements for producing ethanol now. Agriculture and particularly ethanol processing have been criticized as being large consumers of energy. USDA believes that this is not the case. USDA analysis of data collected in our annual surveys of the Nation's farmers indicates that the farm energy index—that is the measure of total energy used in agricultural production—fell from an index number of 108 in 1980 to 60 in 1991. Much of this decline is due to more fuel-efficient power equipment and energy-efficient farming practices. The amount of gasoline, diesel, natural gas, and LP gas that are used to produce agricultural products fell from 1.3 quadrillion BTUs in 1978 to about 650 trillion BTUs in 1989. That is a reduction of approximately 50 percent. At the same time less energy was being consumed, the amount of output per unit of energy input has been increasing. The index of aggregate agricultural output per unit of energy input has increased from 92 in 1974 to 185 in 1990.

The data just cited support the general conclusion that agriculture is considerably more energy-efficient than it was 10 or 15 years ago. However, this general knowledge and perception does not answer specific questions about the energy requirements of producing ethanol from corn. Using the Farm Cost and Returns Survey data, we at the department have estimated the amount of energy needed to produce a bushel of corn. Table 1 at the end of this statement shows that, on average, a bushel of corn requires about 54,000 BTUs of direct energy to produce. Because each bushel produces 2.5 gallons of ethanol, approximately, the energy input per gallon of ethanol is about 21,300 BTUs. When we include indirect energy that accounts for the efficiencies of the direct energy inputs, the total BTU per bushel becomes roughly 60,695, or 24,278 BTUs per gallon.

The next part of our analysis was to estimate the energy requirements for converting corn into ethanol. Using engineering studies of existing commercial ethanol plants, we estimated the average energy requirement for producing a gallon of ethanol. The results are contained in the supporting documents submitted for the record. I will refer you to Tables 10, 11, and 12, which show ethanol's total energy summary; that is, the total energy balances including energy inputs for growing, harvesting, transporting corn, and processing ethanol and then transporting the ethanol to retail outlets. These tables show that ethanol has a positive net energy balance of at least 108 percent. That is, for every 100 BTUs of fossil energy that are used as inputs to produce ethanol, we get 108 BTU's worth of ethanol out of that process.

Now, I would like to mention now and clarify that the 108-percent number is basically our worst-case scenario. That is for the ethanol dry mill process. For the ethanol wet mill process, we are around 125-percent energy efficiency. If you took a weighted average of all ethanol production, you would probably be somewhere in the region of 117-, 118-percent energy efficiency.

Senator DASCHLE. Dr. McClelland, just to compare with gasoline, can you give us the figure on that?

Mr. McCLELLAND. I am just getting to that, Senator.

The energy efficiency of the total ethanol production cycle can be compared with other liquid transportation fuels and their components. For example, gasoline production is about 75- to 80-percent energy efficient when extraction, transportation, and process energy are all accounted for. Methanol, which is a major component of MTBE, is somewhere between 55- and 60-percent energy efficient using the same accounting methods. Therefore, contrary to the assertions that ethanol production requires more fossil energy to produce than is contained in ethanol, our analysis at USDA shows that ethanol has a positive energy balance and uses less fossil energy to produce than other liquid transportation fuels on a BTU-equivalent basis.

Senator DASCHLE. Could you just again reiterate those figures? Because I think that is such an important issue that gets overlooked, oftentimes, and I think it is contrary to what the public understanding of ethanol is. Could you just again give us the relative relationship between ethanol, methanol, and gasoline when it comes to the BTU-equivalent capability?

Mr. McCLELLAND. When we take all the energy that we use to make a gallon of ethanol and we count all that up, for every 100 BTUs of that energy we get at least 108 BTUs of ethanol out of that process. When you compare that with, say, gasoline and you make all the accounting from the extraction of the crude oil and the transportation of the crude oil and the processing of the crude oil and you take all that into account, you get about 75- or 80-percent efficiency, which means that for every 100 BTUs of fossil energy that you use to make a gallon of gasoline, you get about 75 or 80 BTUs of gasoline out of that process. So you are losing energy there.

Why is ethanol gaining energy? Because the energy that is in ethanol is coming from the sun. So it is solar energy conversion.

With methanol, if you do the same kind of accounting, you are probably talking somewhere in the 55- to 60-percent range. Some methanol plants may be as high as 65 percent efficient. So that would mean that if you put 100 BTUs of energy into producing a gallon of methanol—or into producing a unit of methanol, you would get about 65 BTUs out of that unit.

One other thing that we found in our analysis in making ethanol is we were counting BTUs from various energy sources, and we had a relatively good accounting of how much crude oil was used or crude oil derivatives, like diesel fuel and gasoline, was used in the production of corn and processing of ethanol. We thought it would be interesting just to look at how many BTUs of crude oil input we had into the production of ethanol. When we did that, we found that the amount of crude that would be needed to make one BTU of gasoline can be used to make 8 BTUs of ethanol. So on a crude basis, when you compare ethanol with gasoline, it is about an 8 to 1 ratio.

Senator WELLSTONE. Dr. McClelland, could I just interrupt you for one question?

Mr. McCLELLAND. Yes, Sir.

Senator WELLSTONE. With the DOE study—and you are talking about the energy efficiency—how is the solar energy figured in?

Was that as a plus or minus in terms of on the energy efficiency equation?

Mr. McCLELLAND. In the study that DOE originally did in their background data, which was published about a year ago, solar energy had not been netted out of those calculations. It was a total—they had a column in their tables there that just said total energy, which is a correct number. It is part of the energy. But it should be netted out when you are talking about fossil energy, which is, I think, the important thing that we are talking about here.

Senator WELLSTONE. But it was not netted out in—you made the point that the key thing is that the energy from ethanol comes from the sun, but it was not netted out?

Mr. McCLELLAND. That is correct. In the document that they published last summer, which was sort of a background document. Now, in the most recent study that many people are talking about, that solar energy has been netted out in those calculations.

Senator WELLSTONE. But I think, Mr. Chairman, if you look at some of what the Energy and Natural Resources Committee relied on—and I am on that committee—I think it was that first study where it was not netted out. You do not need to speak to this, but I just want to make that a part of the record, because I think that is a very important point.

Senator HARKIN. Very important point.

Senator WELLSTONE. I am sorry to interrupt you. Go ahead, Dr. McClelland.

Mr. McCLELLAND. I would like to turn for just a moment to some effects on Government outlays, because that has been brought up.

Many questions have been raised about what the effect of the renewable oxygenate requirement on Federal Government budget outlays would be, and we have analyzed some of these effects with respect to farm programs and losses in revenue that might occur for ethanol or other renewables that would qualify for the tax incentives that are currently offered.

Recently, Senator Kerrey of Nebraska asked the department to provide an analysis of the effects on farm programs of a 30-percent renewable oxygenate requirement, and USDA analysis concluded that a 30-percent renewable oxygenate requirement would save about \$3 billion in farm program outlays between 1995 and the year 2000. These reductions are primarily due to the effects of higher corn prices and lower deficiency payments. Higher corn prices will reduce deficiency payments and increase revenues to U.S. corn farmers and, consequently net farm income. I think on this issue I am probably carrying coal to Newcastle with this committee, so I do not want to spend a lot of time on this.

I also know that the Members of the committee are aware of a study that the General Accounting Office released, I believe, in 1990, where they looked at increasing the production of ethanol from 1 billion gallons to 2 billion gallons annually, which is about what we are talking about in relationship to this program and the growth of this program in the future. In addition, their report concluded, and I will quote, "that reductions in farm program outlays would exceed the additional tax revenue losses, on average, by about \$488 million to \$608-million-per-year."

We also estimated, along with our \$3 billion in farm program outlays savings, we estimate what we thought would be the consequences for the Treasury and the Highway Trust Fund. Briefly, our estimate was about \$900 million, so the net, the net savings, would be about \$2 billion over the period 1995 to 2000.

Senator HARKIN. I think that is another important point that gets lost. We always hear talk about the losses to the Highway Trust Fund because of the so-called subsidies that we have for ethanol. Yet the other part of that equation is not taken into account, that because of the higher prices that farmers will receive for their grain, the farm program payments will be reduced. You are saying that the studies have shown that over about that 5-year period of time that there is a net plus or a net savings to the Government of about \$2 billion.

Mr. McCLELLAND. That is correct.

USDA is continuing to work on analysis of all of these issues, and we are continuing to work with other agencies, including the Environmental Protection Agency and the Department of Energy. We hope that our input will be useful to our Colleagues.

This concludes my remarks, Mr. Chairman, and I am glad to answer any questions that you or Members of the committee might have at this time.

Senator HARKIN. Dr. McClelland, thank you very much.

We will now turn to Mr. Richard Wilson, Director of the Office of Mobile Sources, U.S. Environmental Protection Agency. Thank you, Mr. Wilson.

**STATEMENT OF RICHARD D. WILSON, DIRECTOR, OFFICE OF MOBILE SOURCES, U.S. ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, DC**

Mr. WILSON. Good morning, Mr. Chairman and Members of the committee. I am pleased to be here and appear before you this morning to testify on issues pertaining to EPA's proposed renewable oxygenate rule.

The first part of my prepared statement has a fair amount of background material on the reformulated gasoline program. I will skip that in the interest of time and jump to the part discussing the proposal itself.

In December of 1993, the Agency proposed a strategy to help assure a role for renewable oxygenates, such as ethanol, in an environmentally friendly way. This proposal requires that 30 percent of the oxygen in reformulated gasoline come from renewable sources, such as ethanol or methanol not made from fossil fuels. To prevent detrimental environmental effects in the summer months, the proposal would not count toward the 30-percent requirement oxygenates such as ethanol which increase evaporative emissions when gasoline is commingle in use. The proposal includes year-round, nationwide trading provisions to minimize cost and maximize flexibility.

The intent of the current renewable oxygenate proposal is to assure that oxygenates, such as ethanol, and potentially MTBE or ETBE, which are based on renewable resources, have a substantial share of the reformulated gasoline oxygenate market, without

sacrificing the environmental goals of the reformulated gasoline program.

EPA believes that this program will assure the diversity of oxygenates in the marketplace. By assuring renewable oxygenates a place in the market, this program will help stimulate commercialization of more advanced technologies with even greater environmental and energy benefits. Expanding the use of renewable fuels made from domestic resources such as corn, grain, wood, and even garbage can help reformulated gasoline clean the air in our cities, lower long-term emissions of harmful greenhouse gases, and reduce the use of fossil fuels.

I would just add that while this proposal would provide for a significant growth in the use of renewables, when fully implemented only one-half of 1 percent of the gasoline volume sold in the United States would be from renewables.

EPA believes it has statutory authority to promulgate such a program, which we believe will provide beneficial effects on fossil energy consumption and greenhouse gas emissions. In the December proposal, we specifically asked for comments on the issues of statutory authority, fossil energy consumption, greenhouse gas emissions, and adequacy of ethanol supply, among other topics. We also held a public hearing on January 14, 1994, to receive testimony regarding the renewable oxygenate proposal. The subsequent comment period closed on February 14, 1994. As Senator Harkin mentioned, we got in excess of 12,000 comments received on the proposal.

Senator HARKIN. You got some more after I checked.

Mr. WILSON. We did. We did. I suspect we will get some more after today, too.

Senator HARKIN. Probably so.

Mr. WILSON. The Agency is presently evaluating these comments and plans to announce a final decision on the proposal in June of this year. As part of this process, we are coordinating with other Federal agencies, including the Departments of Energy, Agriculture, Transportation, and Treasury, as well as the Office of Management and Budget.

I also want to assure the committee that we are working closely with all the fuel provider interest groups to assure the smooth implementation of the reformulated gasoline program as a whole. As part of this process, we are working with refiners of all sizes, pipeline operators, terminal operators, marketers, as well as oxygenate suppliers to address and resolve any potential problems before they occur.

Thank you for the opportunity to be here this morning, and I would be happy to answer questions.

Senator DASCHLE. Mr. Wilson, just to clarify.

Mr. WILSON. Yes.

Senator DASCHLE. It was not in your statement, and I think it is very important that we underscore the overall quantity of fuel we are talking about. Did you say that this would be tantamount to 1.5 percent of the entire market?

Mr. WILSON. I said it was one-half of 1 percent.

Senator DASCHLE. One-half of 1 percent.

Mr. WILSON. Of all the gasoline volume sold in the country, only one-half of 1 percent of that volume would be renewables. This program only affects the reformulated gasoline part, which is about a third of the gasoline sold. Only 30 percent of that would have to have renewables, and only a part of even that gasoline would be made up of the renewable oxygenate.

Senator DASCHLE. I think that is really something that everyone needs to understand. I think there has been, as Senator Harkin has said, a lot of misinformation. We are talking about we have had charges of how we are somehow making the market work through mandates. Well, a one-half of 1-percent requirement that there be renewable fuels in a gasoline market in 1994 in the interest of clean air does not seem to me to be too much.

Thank you.

Senator HARKIN. Thank you, Mr. Wilson.

Dr. Graboski, you do not have a prepared statement, but I would recognize you: Dr. Michael Graboski, director of the Colorado Institute for Fuels and High Altitude Engine Research, the Colorado School of Mines. Welcome. We are glad to take your testimony.

Mr. GRABOSKI. Thank you. I am pleased to be here on short notice. It is hard to get here from Colorado for Memorial Day weekend. It is not easy.

Senator HARKIN. I just want to say, I am sure on behalf of all of us here, we appreciate that. You were not notified until just yesterday about coming here, and we do appreciate it.

Mr. GRABOSKI. But I am here to address your questions to the extent that I can. I have a fair amount of knowledge in this area and in the area of alternative fuels in general. I am here to support Dr. McClelland and questions you may have of the department on work that, in particular, I performed for the department.

Senator HARKIN. I appreciate that, Dr. Graboski.

Mr. Wilson, during the hearing on May 12, in the Energy and Natural Resources Committee, there was, I think, a clear implication made that there was little or no benefit from the use of renewable oxygenates, but EPA's proposed rule on renewable oxygenates in December of last year claimed such benefits. I said that in my opening testimony. I will further quote EPA: "This proposal concerns a program to maximize the energy and other benefits from the reformulated gasoline program while obtaining significant emission reductions in ozone-forming volatile organic compounds and toxic air pollutants."

Does EPA still believe that renewable oxygenates will reduce VOCs and toxic air pollutants?

Mr. WILSON. Well, Senator, as you know, we are in the midst of our rulemaking process, so we are gathering all the information that we can get from all the different sources. But we certainly believe that the renewable oxygenate proposal is likely to lead toward both shifting ethanol use out of summertime and into the wintertime where it can count toward the proposal and also likely over time to lead to an increase—to a new market for ethanol use and ETBE. Both of those trends would reduce VOC emissions in the summertime that lead to ozone in many of the cities across the country.

So there are a number of benefits, environmental benefits, that we think will accrue both in the short term and particularly in the long term as a result of the proposal.

Senator HARKIN. I do not know if you can see that chart there, but this is what we are talking about. This chart shows reactivity for gasoline hydrocarbons and also the oxygenates. I do not know if you can see that or not. Maybe Mr. Thomas can hold that up there.

Basically, along the bottom line is the Reid vapor pressure, blending Reid vapor pressure. Along the vertical axis is the photoreactivity.

If you look at the olefins and the paraffins and the aromatics in the gasolines, they are all kind of bad. They are either very high in photoreactivity or very high Reid vapor pressure. On the other hand, if you look at the oxygenates, they are way down there towards the zero mark; in other words, in terms of being either photo reactive and/or being volatile.

Again, this chart makes the graphic point, that the oxygenates will reduce the VOCs, the volatile organic compounds. Again, this is a volatility chart here just comparing ethanol and methanol.

As I used this chart in the hearing in the Energy Committee a couple of weeks ago, I pointed out that many times people compare ethanol with MTBE. They say, well, MTBE is better than ethanol. Well, yes, that is true if you want to compare apples and oranges. But if you compare the ethanol and methanol, the Reid vapor pressure of ethanol is about a third of that of methanol. If you compare their ethers, ETBE and MTBE, it is about a half. ETBE is about a half the Reid vapor pressure of MTBE. Of course, if you just consider the pure alcohols, you just burn methanol in your car or burn ethanol, you can see, again, that ethanol is about half the volatility of MTBE.

I make two points with these charts. One, all oxygenates are better. Then deciding on the oxygenates, I make the point that ethanol—if you are trying to talk about volatility in reducing the VOCs, which is a major component of ozone-producing smog, you are better with either ethanol, if you are comparing it with methanol, or ETBE, if you are comparing it to MTBE.

That is why this rule is such a good rule, because it recognizes that in the winter months we can use ethanol. Very good on volatility where we do not worry about the smog. But in the summer months where ethanol, of course, is higher volatility, we can use the ethers, ETBE or MTBE, whatever you want to use, in the summer months.

Mr. WILSON. Right.

Senator HARKIN. So that is why I think the rule balances this out and really makes for what someone called the diversity in the marketplace.

Mr. WILSON. And over time, Senator, as you are probably aware, our reformulated gasoline requirements are tightening down. They start in January of next year. But then over time, they are getting tighter and tighter, and it is going to put even more pressure on low volatility in the summer, and I think that is going to also continue to drive the benefits of ETBE as an ether.



Senator HARKIN. I will now recognize Senator Lugar for any questions.

Senator LUGAR. Mr. Wilson, I have two questions. The first question is: Would you review again the impact of the proposal that we support—that is, this panel—on the reduction of CO<sub>2</sub> emissions, the so-called greenhouse gas?

Mr. WILSON. Well, again, this is one of the issues that we are collecting information on. There is some diversity of views. There does not seem to be much question that with regard to CO<sub>2</sub> that renewable oxygenates tend to have lower CO<sub>2</sub>, lead to lower CO<sub>2</sub> emissions.

On the other side, however, production of the renewable matter through farming tends to have somewhat higher nitrogen emissions, which are also a greenhouse gas. So on net, the recent DOE study, for example, suggested that with current technology in farming and ethanol production, they tend to net out. Other studies show a slight benefit.

We think it is particularly important to be implementing the reformulated gasoline program in a way that does not interfere with this continued increase in the renewable program in this country, largely because it is promoting technologies that we think are both more energy efficient on the production side and less nitrogen-using on the farming side, which we think over time is going to have a clear benefit from a global warming standpoint.

Senator LUGAR. Let me ask, what implementation problems do you see with this proposal, and how would you recommend that EPA address them?

Mr. WILSON. Well, that is another area we are studying. We are looking at implementation programs, as I mentioned. When fully implemented, this is a relatively minor change in the overall gasoline pool in the country. On the other hand, it is a major increase in the use of renewables in the reformulated gasoline cities. We have mentioned it is about 700 million gallons of renewables. I think most of the cities are now using only about 80, so it is a major increase in the use. It is also a major increase in the blending capacity for the areas.

So we are looking hard at will the ethanol production capacity be there. As you know, we expect to get this rule out in June. The production has to start December 1 at refining. So we have only got about 5 months between a final rule and when this gasoline has to flow out of the refineries. It is not a lot of lead time for the program.

We are in it for the long haul, so we want to make sure that we do it in a way that does not cause problems for the public, either in terms of shortages or price hikes. So we are looking carefully along with the Agriculture Department and the Energy Department and other experts at startup issues and how we can make sure this program works smoothly.

Senator LUGAR. Thank you.

Senator HARKIN. Thank you, Senator Lugar.

I just want to follow up on the first part of Senator Lugar's question. We are all aware of the study, and what you are saying is that the greenhouse gases that are emitted by growing corn add to

the greenhouse gases, obviously, and that has to be taken into account.

Mr. WILSON. Yes.

Senator HARKIN. But I believe the study omitted something. They looked upon corn farmers as either growing corn or they will grow nothing. In other words, you either grow the corn and you make the ethanol, or you don't grow anything. But that is not true. I think all of us agree that in corn-producing areas, if that farmer is not producing corn, the farmer is likely going to produce soybeans. I do not know if you are aware—there are studies which show that soybeans emit twice as much nitrous oxide as corn fields. I do not know if you are aware of that.

Mr. WILSON. Yes.

Senator HARKIN. So, again, if you are switching from growing soybeans to growing corn, then you would have a net reduction in nitrous oxide rather than a net increase in nitrous oxide. I hope that is taken into account during this period.

I just wanted to follow up on that because it is something that I hear a lot about.

Senator Daschle?

Senator DASCHLE. Again, as you say, Mr. Chairman, a lot of misinformation, and that is a very important point as well.

I would like to go back to a concern that I raised in my opening statement, and that has to do with one of the other reasons. We talk a lot about the need for clean air. We talk a lot about the need for finding, through environmental regulation and good legislative enactment, an expectation that we will see cleaner fuels in the future. But that is one of the motivations. Another motivation is to limit the dependency that we have on foreign sources for whatever fuel we may be using.

My chart to the right here, to my right, shows fairly graphically what is happening with MTBE imports between now and the year 2000, a dramatic increase; in fact, a tenfold increase from what we saw in 1990. Along with that increase, of course, the prices of domestic natural gas, the feed stock that we use to make methanol, is well above \$2 per 1,000 cubic feet and has been for some time now, as you can see on this chart.

The 1994 average price is now expected to be well above that. In fact, it is supposed to reach about \$2.50. At these prices, domestic methanol producers cannot compete effectively with foreign producers, in part because of the tremendous foreign subsidization and in part because of the availability of supplies. Today, domestic methanol prices are the highest in the world. Natural gas prices are expected to continue to stay high at these levels for the foreseeable future, meaning that the future of imported methanol and MTBE is going to continue to stay as significant as what we see in this chart.

We are told the capacity now being sited in the Persian Gulf is even increasing as we speak, with greater expectations of imports from the Persian Gulf. I would like to ask Dr. Graboski or Dr. McClelland if they are familiar with these trends, and given the statement by DeWitt and Company just last month that "the best estimates are now that MTBE imports will have to double or perhaps triple in the 1995-96 time period," whether they share that

view and whether, absent any renewable oxygenate rule, we will not continue to see the trends that are depicted on the two charts that I have just cited.

Mr. McCLELLAND. I would tend to agree with the overall statement that you have made, Senator. I am not intimately familiar with the details of import projections. I have seen the MTBE import data that you present here, and it does seem fairly reasonable to me.

I am a little bit more aware of what the price projections on natural gas are because we also have information that is supplied by Cambridge Energy Research Associates to the Office of Energy that indicate the same trend that you have indicated here.

I think the question that you raise, though, is really a question of what is our dependency on energy in this country and what might be the benefits of a renewable oxygenate requirement to some of that energy dependence.

We know by just looking at the Department of Energy's numbers that, on a fossil energy basis, if we compare reformulated gasolines made with MTBE with those made with ethanol or with ETBE, that we will use less fossil energy. The energy balances are less, 3 percent or somewhere around that range.

With ETBE, we also will use less oil. With ethanol, comparing that to MTBE, we may use slightly more oil. But then you are raising the further question: If you put ethanol in gasoline and you displace MTBE, what MTBE are you displacing? Is it domestic MTBE made with domestic resources, or is it imported MTBE that will be made, for instance, in the Persian Gulf?

I think that your point well illustrates this energy security issue, because we believe that is likely to be the case, and actually, much of that MTBE will be crude-derived MTBE and not natural gas-derived MTBE. So on an oil basis, we could actually not be decreasing our dependence on oil. It may be oil-based MTBE that is coming in as foreign imports as opposed to domestically produced MTBE, which on the margin is probably going to be made from natural gas resources.

Senator DASCHLE. I see you shaking your head affirmatively, Dr. Graboski. Could you confirm or elaborate?

Mr. GRABOSKI. Yes, I pretty much agree with Dr. McClelland's statement. The issue that we are looking at in the year 2000 is that domestic MTBE production that would be required on the marginal gallon or the marginal barrel does not exist today. We are making plans today for the year 2000 based on is it going to be cheaper to import or is it going to be cheaper to make domestically.

DOE's study assumes the marginal MTBE gallon is to be produced from natural gas liquids. Natural gas liquids' end price is going to be tied also to the price of natural gas and the cost of production. The cost of production of MTBE by natural gas liquids is relatively high from a capital point of view.

The net result is that there is a high likelihood that what we should be comparing ethanol crude efficiency against is imports and not natural gas liquid-based MTBE. If that is the case, some of those imports are going to be oil-based, not natural gas-based,

and then you are basically looking at the crude efficiency comparison of ethanol against methanol, and that is probably at least a wash.

So I think the argument of crude oil efficiency, or lack of, for ethanol relative to MTBE might not be an accurate scenario.

Senator DASCHLE. So we have talked about the environmental consequences, and now we have talked about the energy dependence consequences. Let me just touch on one other thing in the first round of questions here, and that has to do with another issue you raised, Dr. McClelland. That is the economic consequences, and those consequences as they relate to the deficit.

I have a chart that I would like to use to make the point, and I would like you, if you could, to elaborate because we have not just one Federal agency but two Federal agencies that have over the years analyzed the implications, economically and budgetarily, of an ethanol policy in this country.

In both of those analyses, it has been unequivocally made clear to us that there is a substantial savings to the Federal Government, in part because of the economic consequences of a strong ethanol policy. You did not make reference to the GAO study in your comments, Dr. McClelland, but I would like you, if you would, to share with us the degree to which you and the GAO share the same view with regard to the implications economically of an ethanol policy in this country.

Mr. McCLELLAND. Well, I believe that the figures that I stated in my prepared remarks and what GAO says in their study on this issue, the July 1990 release, directionally say the same thing. They say that at least in the range of use of ethanol that we have currently and that we would expect to have over the next at least 5 years, and probably even longer than that, that the savings, the net savings we have from producing more ethanol far outweigh the losses that we have to either the general treasury, if the blenders' tax credit is utilized, or the Highway Trust Fund, if the excise tax exemption is utilized.

I agree. I do not think that there is a lot of differences of opinion on what the direction is. There may be differences of opinion about what the exact effect is, and as you all know on the Agriculture Committee, assumptions about what is going to happen in the future can change quite rapidly. When we have a drought or we have flooding, we have those kinds of effects on agricultural output. We have high risks there, and those projections change.

But I think that generally the statement that I made earlier we would generally feel that the prognosis is likely to continue, that we are likely to see some tight markets. One of the things that we have not, for example, done at this point is factored in Uruguay Round effects. We do not usually do those kinds of things until we actually have a law, and we do not actually have a law yet. So Uruguay Round effects have not been factored into what the department's long-term projections are going to be.

Senator DASCHLE. Well, I have heard some criticism of the Agriculture study as something that might be expected from a department of Government that work with agriculture. You are seen as an advocate, and understandably so. But I think it is worth emphasizing that your role is also to give us objective information, to give

us the best analysis, good or bad, of the implications of whatever it is we do.

There have been times when I have very strongly opposed a Department of Agriculture analysis because it is not in line with my belief on something, but I think it is important that we take that analysis and recognize that it is in concert with probably the most objective, at least perceived to be the most objective analytical agency of the Federal Government, the General Accounting Office.

So you have served us well with your analysis, and I appreciate the fact that in providing us with your data it is in such close concert with the General Accounting Office information shared with us as well.

Thank you for that, and, Mr. Chairman, I will have additional questions, but I will wait for a second round.

Senator HARKIN. Thank you very much, Senator Daschle.

Senator Grassley?

Senator GRASSLEY. Mr. Chairman, let me once again thank you for holding this hearing and helping to hopefully clear the air. I hope that what you predict will happen: that we will have this rule and have it by June 15.

In regard to some of the problems that we have about imported oil, before I ask a question I want to make a point that Senator Johnston of the Senate Energy Committee—and I think this came during the debate on the Clean Air bill or some other legislative issue we had that dealt with imported oil. Anyway, he stated the real costs of imported oil to be as high as \$200 per barrel. Of course, that also includes a defense strategy that we have for keeping our oil lanes open and things like that, but, still, a cost of imported oil that makes it very economically beneficial, from the economics point of view, to do what Senator Daschle is talking about here.

I believe, Mr. Wilson, you will have to be the one to answer this question, and before I ask the question, I have some examples I want to give of what I consider shoddy science by EPA, and probably people higher up than you and even in other administrations should answer this. Let me tell you, the frustration I have with that is similar to the political frustration I had during the Bush administration. There was one of his top advisers driving a methanol-powered car all the time. I do not care—during those years that we were trying to fight this battle, whenever there was a block to President Bush making the decision, it was always with that person.

Now, I do not think that person is unethical or anything, but I do think that that tends to show maybe we do not have the open-mindedness about this issue we should have. I do not think that there has been an open-mindedness on it within EPA either. I speak about shoddy science, and I think it leads EPA to refuse to recognize, let alone promote, the positive environmental impact that ethanol brings to the renewable oxygenate standard.

Moreover, EPA's evaluation of ethanol's impact on ozone formation I think has been very biased from day one. I am not talking just about this administration. I am talking about from day one when we started fighting this thing just as soon as we got it through the floor of the Senate. Quite frankly, after 10 years of

hearing of big oil's opposition to ethanol, it was during that debate that I could ever pinpoint, that it really surfaced. Before that, it was always suspicion that big oil kept ethanol from moving through the process. But at that time, I think that it really surfaced, and we really did have to fight it. But I could never be certain that big oil was behind the anti-ethanol bias before.

I want to give four examples. When the Ann Arbor ethanol testing for speciation profile failed to produce the anti-ethanol results that EPA hoped for, the car's gas cap was removed during the test, and, of course, that did the trick. The volatile emissions hoped for by EPA were realized. On the other hand, remember people do not drive their car without gas caps. That is not science. It is not very professional as far as I am concerned. In fact, it is fraudulent, and, frankly, I think it should be criminal.

Secondly, the new commingling model undermines the testing of environmental impact of this specific ROS rule. The model has never withstood scientific peer review. In fact, EPA staff has failed to correct some 30 technical computer errors that would improve the testing outcome for ethanol.

Third, even though acceleration of freeways can increase by 200 times the amount of exhaust emissions from cars, EPA refuses to give ethanol credit for its ability to greatly reduce exhaust emissions in these circumstances. Of course, unlike driving without a gas cap, everyone has to accelerate constantly, stop and go, speed up and slow down, in urban ozone nonattainment areas.

Fourth, and lastly, is how I think a professional was treated by EPA, and I think it is evidence that if there are some people who disagree with EPA's biased positions, their professional reputation might be threatened. I would give you an example of EPA's tradition, until recently, of working very closely with Dr. Gary Winton, a chief scientist with Systems Application International, and now—and I do not think it is coincidence that once Dr. Winton started producing work that supported ethanol that EPA dropped him from EPA contracts.

Now, in sharp contrast, EPA will go to any length, I think, to extol the virtues of MTBE while at the same time ignoring thousands of consumer complaints about MTBE's adverse health effects that we have talked about already here.

So, Mr. Wilson, if you can speak for the EPA, I hope that you can promise this committee that this entrenched bias of the operation of EPA can be put aside so that the final rule on ROS will be produced, clearly reflecting the positive record established for ethanol and its positive energy, environmental, and economic benefits.

Mr. WILSON. Yes, Sir. Thank you, Senator, for the change to respond. I think—

Senator GRASSLEY. And if you want me to give documentation, I will be glad to give documentation.

Mr. WILSON. First of all, I would say I think our proposal for the renewable oxygenate standard suggests that we are trying to assure a role for renewables in the reformulated gasoline program. I think as we developed it—and, frankly, one of the benefits of this proposal over previous proposals is—we tried to jump around some of the very difficult technical issues you just went through. We had

lots of difficult discussions. Historically there are lots of disagreements on each side.

We tried to pattern this proposal to avoid some of those so we did not have to have disagreements about was the proposal going to be good for the environment or bad for the environment. We think we have a proposal that is good for the environment, does not get into any of the issues that you went through, does not require a modeling analysis to suggest that even though emissions are higher it is not going to have an ozone problem. Those are all difficult issues where a lot of people feel strongly on both sides, but we think we have been able to craft a proposal that, in fact, has not been criticized very severely by environmental groups, and I think most have supported it as much better than previous proposals trying to deal with this problem.

As an aside on the MTBE issue, I do need to say that last year, as a result of some issues that were raised in terms of MTBE usage as part of the oxygenate program, EPA undertook a major series of health studies that we coordinated, and all that data came in at the end of last year, and there is just nothing in that data—certainly, Senator Harkin, I would not want to drink a glass of MTBE or probably a glass of denatured ethanol. But as far as use in gasoline, we found nothing in terms of adverse health effects from MTBE use that would in any way question its continued use. And, frankly—

Senator GRASSLEY. Weren't there two States that stopped using it, Alaska and New Jersey, a year ago last winter?

Mr. WILSON. Alaska has stopped using it, and we are continuing to look at whether the arctic temperature conditions particularly in Alaska create some unique situations. But, no, that is the only State that stopped. New Jersey did not. Again, I—

Senator GRASSLEY. I want to yield to Senator Harkin.

Senator HARKIN. Wait a second.

Mr. WILSON. Yes, Sir.

Senator HARKIN. We asked the Centers for Disease Control to do a study on this, and as far as I know, they have not fully completed that yet.

Mr. WILSON. Well, there are a whole series of studies—and the CDC was involved—that we did last year. I would be happy to submit that whole report to the committee.

Again, that merely says, as we continue this reformulated gasoline program with our proposal, while 30 percent of the oxygenates will be renewables, 70 percent would be nonrenewables, and probably largely MTBE. I just wanted to say that we have no health basis to suggest that the use of any of those oxygenates is going to cause health problems.

Senator HARKIN. But even on the labels of methanol and MTBE, it says "vapor harmful."

Mr. WILSON. Senator, gasoline is not a substance you would want to drink either, and I think probably—

Senator HARKIN. I am talking about the vapors now. I am talking about smelling it. I have here some MTBE. I do not ask you to drink it. I am not trying to get into battle with you here. I am just saying that there are some things that you can tell just by the very nature of it. MTBE, the vapors of it, will make you sick.

Mr. WILSON. Senator, that is one of the—

Senator HARKIN. The vapors of ethanol will not make you sick.

Mr. WILSON. That is one of the issues we did study as part of this research program. It was peer reviewed. I would be happy to get you a complete study. We found no reason to question the continued use of any of these oxygenates in gasoline as causing significant health effects.

Senator HARKIN. Well, I would like to see that.

Mr. WILSON. I would be happy to provide it.

Senator HARKIN. I was not aware that the CDC has come out with its conclusion yet.

Mr. WILSON. I would be happy to provide you all this information.

Senator HARKIN. I would appreciate that.

Senator GRASSLEY. If you are done answering my question, I am done with my questioning.

Mr. WILSON. Yes.

Senator GRASSLEY. Thank you, Mr. Chairman.

Senator HARKIN. Thank you very much, Senator Grassley.

Senator Exon?

Senator EXON. Mr. Chairman, thank you very much.

Gentlemen, thank you for being here. You have been very helpful and very straightforward.

Let me ask this question of you, Mr. Wilson, since this matter has been brought up, directly or indirectly. It is a subject of considerable public discussion and speculation today.

Have you seen anything within your agency that would indicate any retreat from the strong stand that the President took and announced as a part of his administration directive?

Mr. WILSON. Well, I am in a difficult situation. As you know, we are in the midst of a rulemaking process where we are required to go through—

Senator EXON. I understand that, and with that caveat, have you seen anything within the administration to indicate there is a retreat?

Mr. WILSON. No, Sir.

Senator EXON. That is all I want. That was the answer that I was trying to get to.

I would like to close and once again thank the Members of the Ag Committee for holding this meeting. I do not like to end on a discordant note from the position that some of my Colleagues have taken, but I would simply like to talk a little bit more about what I had referenced earlier, Mr. Chairman, and that is that as uncomfortable as it might be for some of my Colleagues on both sides of the aisle and as convenient as it is to come here and attack big oil, which we all have done in one form or another today, I would simply say that the environmental community is playing a key role in this. While it may not be as interesting or as exciting to attack the oil companies and not the environmental community, I would simply say that, in my opinion—and this is only my opinion—that if there is any retreat from the position that the President has taken—and as I said earlier, I have seen no indication that that is about to take place. The question that you just frankly answered,



Mr. Wilson, substantiates what I believe to be the case. Nevertheless, I think we should understand that there are forces at work.

I salute the Environmental Protection Agency for your careful review of the rules and regulations that you are now promulgating in this effort. I suspect that one of the reasons for that is to try and forestall a lawsuit brought by big oil and maybe in cooperation with their strange cohorts in this area, at least some segments of the environmental community, that maybe you can avoid a lawsuit. I think you cannot. But not being a lawyer but looking at many lawsuits, I would suspect that—I do hope that you will carefully review as you promulgate these rules and regulations to give big oil and some of their environmental associates any chance to be successful in the lawsuit. I think it is going to come on this one way or another because there is so much money involved, as I indicated in earlier testimony.

Mr. Chairman, I would say that I do not take a back seat to very many in the Congress of the United States on environmental concerns. I believe the last amalgamated score sheet for all environmental concerns gave me a high 70 rating. Therefore, I consider myself an environmentalist, a reasonable thinking, “head screwed on right” environmentalist, if there is such a thing. I would simply like to quote some major concerns that I think we have in this area, despite what other Senators may have said this morning.

In an article from the *Washington Post* of May 13, 1994, I would simply quote, I think, some very important phrases that came out of the last testimony that was held by the Energy Committee on this subject. It says, and I am now going to quote from the *Post*, “Two unusual allies at the hearing were A. Blakeman Early, the Washington director of the Sierra Club, one of the best known environmental groups, and Robert J. McCool, the executive vice president of the Fairfax-based Mobil Corporation. McCool testified on behalf of the American Petroleum Institute, a trade association representing more than 300 petroleum industry companies. Mr. McCool said the environmental proposed mandate for reformulated gasoline goes well beyond his legal authority and represents an ill-advised government intrusion into the marketplace. The Mobil executive warned that, if implemented, the EPA requirement would undoubtedly lead to a lawsuit against the Agency.”

“Early”—Early, remember, is the director of the Sierra Club—“proposed renewable oxygenated programs were illegal and violated the negotiations among various contending parties that supposedly formed the basis for reformulated gasoline regulations.”

I certainly happen to feel, Mr. Chairman, and I say this for the record, that as far as I know, there are no big oil moles within the Clinton administration. At the same time, I would say without being able to name them offhand—I think research would dig those up—that there are all kinds of environmental moles inside the Clinton administration. Therefore, I say that it is very politically popular for us to take on big oil, and I have. But with that, I want to issue the caveat that if we lose this important issue, it is going to be not solely the blame falling on the big oil companies, but a major share of the responsibility will fall on the Sierra Club, their fellow travelers, and if we lose this, I would have to say that they

are as much if not more to blame than even big oil with all their money and all their lawsuits.

Mr. Chairman, thank you once again for holding this hearing.

Senator HARKIN. Thank you very much, Senator Exon.

Our Colleague, Senator Kerrey, could not be here this morning. His daughter is getting an award in school, and that should be his first priority, and it was, and so he is in Nebraska today for that event. He did have a question that he wanted me to ask on his behalf.

Recently, a long-time energy industry analyst by the name of Fred Potter, publisher of *Fuel Reformulation Magazine*, wrote to nearly 20,000 individuals nationwide to remind them of "Methanol's Achilles' Heel: toxicity, safety concerns, energy balance, and the questionable practice of inefficiently converting high-quality natural gas to toxic, low-BTU methanol."

What can you tell us about methanol's toxicity and safety? And just how efficient is the conversion of natural gas into methanol and MTBE? Certainly we have covered that, I think, in the question that Senator Daschle earlier asked about the efficiency of the conversion, and the toxicity and safety I think we have amply demonstrated here this morning. But I just wanted to say that Senator Kerrey also, as you all know, is extremely interested in this issue, and but for the fact that his daughter is receiving an award in school, he would be here this morning.

Let me ask one other question here. Mr. Wilson, you are talking about this health study. Can you elaborate for me a little bit more? What study are you exactly talking about, about the health effects of MTBE?

Mr. WILSON. MTBE?

Senator HARKIN. Yes.

Mr. WILSON. Yes, Senator. As you raised, during the first winter of the oxygenate program, which was one of the first clean-fuel programs under the Clean Air Act we rolled out, not this past winter but the winter before, there were some issues raised, particularly in Alaska, about whether the smell that is associated with MTBE caused health problems, short-term acute health problems.

Senator HARKIN. Right.

Mr. WILSON. As a result, EPA's Research Office, along with CDC and a number of other groups, conducted a series of research projects looking at service station operators in New Jersey, for example, where it is all full serve so that you have people who are actually doing the filling, and, in fact, exposing some people in chambers to low levels of MTBE just to determine whether or not there were health effects: headaches, watery eyes, those sorts of things that we can associate with MTBE.

The results of those studies came in. They were peer reviewed. Workshops were held, and as I said, the net result was we were unable to find any significant health effects which would cause us to question the continued use, as I said, in general, of any of the oxygenates that are helping so much in terms of getting this reformulated gasoline cleaner, and, therefore, cleaning up the air pollution in our cities.

Senator HARKIN. So this was a study—

Mr. WILSON. It was a series of studies during 1993 that looked at short-term health effects.

Senator HARKIN. And these studies were funded by EPA?

Mr. WILSON. Well, they were funded by a series of groups. We funded some of them; CDC did some work. Some of the oil industry and oxygenate industry people also funded parts of the study. So there was sort of a coordinated group, a variety of studies that were done. As I said, we would be happy to provide all that information to the committee.

Senator HARKIN. Would you get that to my office as soon as possible?

Mr. WILSON. Sure.

Senator HARKIN. I would like to take a look at it, Mr. Wilson. I would like to know just who did the studies and the funding for them.

Mr. WILSON. Sure.

Senator HARKIN. Like I said, I remember myself personally asking CDC, since they are under my jurisdiction on Appropriations, to look into this matter. I was unaware that they had come to a conclusion yet.

Mr. WILSON. We will get you all the results.

Senator HARKIN. I appreciate that.

I had one last thing, and it had to do with the capacity question that has come up. You mentioned it, I think, Mr. Wilson. Perhaps I could also ask Dr. McClelland about this issue or Dr. Graboski, either one of you. There has been some speculation that the ethanol industry will not be able to meet the demand for renewable oxygenates by January 1, 1995. Do you believe from your analysis that there is adequate ethanol capacity existing to meet this demand, or will there be enough by that time to meet the demand, or will there not be? I would like to know the answer to that question.

Mr. MCCLELLAND. The answer to that question, the short answer to that question is that there already is enough capacity in existence to meet the requirements of the renewable oxygenate requirement.

Senator HARKIN. Already in existence?

Mr. MCCLELLAND. It is already in existence. As you recall from—and you can take the EPA's number, or you can take our number. They say 630 million gallons; we say 680 million. I think that is really the same number.

That is how much ethanol would be required to provide 2-percent oxygen in 30 percent of the reformulated gasoline in the areas that are covered in 1995, starting in 1995.

Senator HARKIN. OK. So we will split it in half, 650 million gallons will be needed in 1995.

Mr. MCCLELLAND. That would be required in 1995 to meet the needs of this program.

We estimate right now that domestic ethanol production is somewhere between 1.1 and 1.3 billion gallons and growing. But if you do not want to take my word for that, then look at what the International Trade Commission says. They are required under the Caribbean Basin Initiative law to report every year what the domestic

ethanol market is for the previous 12 months. Every September 30, they are supposed to make that report.

Last September 30, their report concluded that the domestic ethanol market was 1.15 billion gallons. That was published in the FEDERAL REGISTER some time shortly after September 30. So that was one of the base numbers that we used to say that that is how much ethanol capacity we actually have.

So obviously there is enough capacity to meet the requirements. I think that the issue that you are bringing up here and that I alluded to in my written comments is that 500 million gallons of new capacity would be required to maintain ethanol in markets that currently have ethanol sold in them, and meeting the new requirements to have enough ethanol to fill up the renewable oxygenate requirement, those additional areas. There is some overlap, about 150 million gallons of overlap.

Mr. WILSON. If I might chime in a little, Senator, I think—

Senator HARKIN. I do not know if I understand this completely, but go ahead, Mr. Wilson.

Mr. WILSON. The issue is there is plenty of ethanol production now to cover this program, but only if you move a fair amount of the current usage of ethanol from areas that are not reformulated gasoline areas into cities that are. Only about 80 or 100 million gallons of what John was talking about is actually used in these cities that would have reformulated gasoline, and obviously this program is not going to be particularly helpful to the renewable industry if all we do is shift that current ethanol use from some cities to other cities. In the long run, what John was saying is we need to make sure that new capacity is brought on line in a timely way to cover this increased use into new cities so you do not lose existing markets in the process.

And it is not only a production issue. It is also a question, as I said, of very little of the renewable are used in these reformulated gasoline cities. So the other trick is to get the ethanol from the production plants into those cities and to make sure you have enough blending capacity to be able to do that. Those are the logistical issues that we are all in the midst of looking at to figure out just how to make sure, if we turn on this program, we do it in a way that sticks and that is publicly acceptable and does not have shortage or price hike problems.

Senator EXON. Mr. Chairman, could I comment on that for just a moment?

Senator HARKIN. Sure.

Senator EXON. I think we are ending up on some very key points here, and I believe that the answer to the questions that our very distinguished panel has just given us on this matter would indicate at least what I have told you and Senator Daschle and others in our various behind-the-scenes meetings on this. I would not be surprised—I have no inside information; I have not talked to anybody at the Environmental Protection Agency other than our discussion here in public this morning, Mr. Wilson. I think that is in keeping with the spirit of the rules that we have in place.

But I happen to feel that we should not be surprised if the Environmental Protection Agency rules provide some kind of what I would describe as a fast phasing-in of the proposition to stay away

from a key part of a possible lawsuit by big oil and their associated environmental interests against what the rules would be. That is, if we can keep away from giving them an early-on advantage by saying that we have mandated and established rules that are unreasonable from the standpoint that we could not fulfill the gap that has been created or would be created basically by the maldistribution of ethanol today, then I am not sure that that would be necessarily a bad thing.

If it happens that way, at least as one Senator I would not consider that a backing away from the President's initiatives.

Senator HARKIN. Do you mind if I just ask one question, Senator Daschle?

Senator DASCHLE. No, no. Please do.

Senator HARKIN. I just wanted to follow up on this capacity thing one more time here. Right now, as I understand it, we have now a capacity of 1.4 billion gallons.

Mr. MCCLELLAND. Roughly.

Senator HARKIN. Well, I have 1,418,300,000 according to this table I have here. That meets current demand. What you are concerned about, Mr. Wilson, is not taking it out of those areas where it is used and putting it into those RFG cities, but how do you get them both moving along.

Mr. WILSON. Right.

Senator HARKIN. Then looking further at a table showing production capacity under construction—and here are the startup dates. Cargill has one under construction for startup, first quarter 1995. There are six new plants under construction. The latest startup is second quarter 1995. They are all either this year, third quarter 1994, third quarter 1994, first quarter, first quarter 1995, two in second quarter 1995. The capacity of those would be 255 million gallons of ethanol. So when you add that up, you get 1.6, over 1.6 billion.

So if that is the case, then why is there the concern that we would disrupt the market we have now in order to produce the ethanol or ETBE for next summer, which we will need the ethers for next summer, if this is the case, if we have this much under construction?

Mr. WILSON. Well, Senator, again, we are looking at all that data, and we have not made any judgments. I do not want to sound conclusive at all. The point, though, is that the way our rule works, we do not expect a lot of new ethanol use during the summer. Over time we expect to see more ETBE, but we are not sure how much of that will occur the first year. So there is a lot of pressure on the winter months, both starting in January of next year through that winter and then the following fall, to maximize the use of ethanol during those periods when there is no volatility control issue.

So those are sort of precious months at the front end of the program in terms of meeting the requirement. There is a lot of additional capacity coming on line, and it is right around that time. So over the long run, we do not have any concerns at all. Over the instant startup, I think we are looking at the issue, and as I mentioned, it is not just ethanol production. You have to get all that new production to the markets, and as I mentioned, most of these markets are not historic ethanol markets.

So making sure that we can get the ethanol there and that there is blending capacity to get it in the gasoline or some of the logistical issues that we are looking at, again, we want to make sure the program, you know, stays in place over the long term and that we do not have logistical problems at the front end.

We had, for example, about a 4-year lead time on low-sulfur diesel fuel, which is a program we started last November, and despite all that lead time, we still had pockets of shortages and price rises around the country, some in farming areas. You may have heard about them. I think we were able to deal with most of them relatively easily, but even with that much lead time, we had problems. As you know, when you fool around with people's cars and their gasoline and something happens bad, they remember that a long time. We had a lot of problems in the early years of oxygenate programs in some of the cities around the country.

So we have kind of learned that you need to do these well at the front end to keep the public with you.

Senator HARKIN. Don't get me started on that low-sulfur diesel fuel because the diesel prices in Iowa went sky high even though they had a surplus. This was not low-sulfur diesel fuel; it was regular diesel fuel.

Mr. WILSON. Yes, we know. We understand.

Senator HARKIN. The same all over the Midwest. They just jacked those prices up, and there was no reason for it.

Dr. Graboski?

Mr. GRABOSKI. Yes, I had a comment in this area, and this is a personal comment. It is not a comment that has anything to do with my relationship with the Department of Agriculture.

The reformulated gasoline program, as I see it, is a pretty massive program coming on the first of the year, and as Dick Wilson has pointed out, when programs like this come into place, there is disruption. There may be shortages. There are difficulties. People have problems. People complain, well, the gasoline is just not the same gasoline I used to have. My car is not running good.

You know, ethanol has suffered—it may be unfair, I do not know, but it has suffered an image problem in the past. Also, a coupling of the program at 100-percent full scale with the reformulated gasoline program coming on is an opportunity for many, many more problems to arise and for public relations problems to arise such that difficulties associated with the gasoline program, certainly people can say, are problems associated with ethanol.

I would like to see in my own mind a situation created such that we give reformulated gasoline an opportunity at least to shake out a little bit before we put on top the full implementation of an ethanol program so that we give our program the greatest opportunity to succeed. That is just a personal opinion. It is not an opinion that has anything to do with the EPA or USDA. I think we would benefit ourselves by not rushing into things to the extent that the full implementation of the proposal the first of the year would cause us to do.

Senator HARKIN. Senator Daschle?

Senator DASCHLE. Mr. Chairman, we are quickly running out of time, and I do not want to belabor the hearing anymore. Our witnesses have been extraordinary in their assistance to us, and we

deeply appreciate their presence here and their excellent contribution to this discussion.

Let me just finally address one criticism that surprisingly we hear in light of the studies that have been done by the Department of Agriculture and the General Accounting Office, and that has to do with the effect for the average family farmer, whether or not an ethanol industry does have a positive contribution to make to agriculture.

Could you just summarize very briefly, Dr. McClelland, what this means for a typical family farmer?

MR. MCCLELLAND. I would not have a dollar value on that, because it certainly depends on where you start when you are making any estimate on what would happen to farm income. But as I said in my opening remarks, when corn prices increase—and it is just not the corn price because, as you all know on the Agriculture Committee, there is a lot of rippling through other commodities and the support prices of other commodities, and there is a lot of inter-commodity price effects that occur.

But if we just look at the simple rule that one might use, if you just look at the corn price, if it goes up 10 cents a bushel and we have about 5.5 billion bushels that are covered by the program, then that is a \$500 million savings to the Government. But when it goes up 10 cents a bushel, all of the corn that is grown—a couple of years ago, last year we had a fairly sad crop, but I think we were up around 9 billion the year before that. All of those bushels receive the benefit of a higher price, which is the reason that we are saving some money there.

The consequence is that farm income goes up as a result of that, so it is not a 1-to-1 relationship, as you know, between deficiency payments and farm income. When those deficiency payments drop, farm income is going up because all of those bushels are receiving the benefit of a higher price.

I think that the point that Senator Wellstone was making earlier as well about the impact not just even on individual family farms but on farm communities and rural communities that are dependent on the farm economy, when you go to a place like Marshall, Minnesota, or to Aberdeen, South Dakota, and you see the impact that an ethanol plant is having, sure, it may be a few jobs to people who are working in the plant, you know, 15, 20, 30 jobs there. But it means a lot to the income of people, of farmers who are supplying corn and oftentimes getting some premium for having a long-term contract with the ethanol plant. It is a sure, steady, lower-risk market for them, and I think that we—every time I talk to farmers about this, they tell me: Don't let this ethanol program go away because we need it, and it is really helping us out.

That is the comment the I would have on that issue.

Senator DASCHLE. Thank you. It was an excellent comment, and I appreciate very much your presence here today.

Senator EXON. Mr. Chairman?

Senator HARKIN. Yes, Senator Exon?

Senator EXON. Just let me add my thanks to all of you for the excellent testimony. I just have one last question in closing.

First, Dr. Graboski, thank you very much for the statement you just made a few moments ago. I think it places in perspective what

some of us have been concerned about on this. That is why I said what I did about what I expect, without any inside information, to come out of the final rules and regulations. Thank you for that.

I especially thank all of you for your forthright presentations here. I want to thank you, Dr. McClelland, and please take the word back to the Secretary. You and the Department of Agriculture have been resolute and unflinching in all of this, and we appreciate that very, very much.

My question to you might be: Can you comment on or do you have any knowledge of the other agencies and Secretaries in the Clinton administration? Has there been interplay and discussion between you in the Ag Department with other agencies? I think you probably have stayed away from the Environmental Protection Agency because of the rules and regulations now being written.

What about the other Secretaries and agencies of Government? Have you had an inter-working relationship with them or discussions on this matter?

Mr. MCCLELLAND. Well, I will disagree, first of all, that I have stayed away from the Environmental Protection Agency. My friend and Colleague, Dick Wilson, and I have spent a considerable amount of time discussing many of these issues. As Dick has mentioned in his remarks today, we have had a lot of issues that have come up, and I think that we have had some extremely thoughtful discussion and very useful discussion. We have also been working quite closely with analysts from the Department of Energy with regard to the study that is currently being peer reviewed. We have been involved in the peer review process with DOE on that analysis, and we will continue to do so.

We have also had contacts with other agencies, including, I think, as Dick mentioned, Treasury and Transportation, have been involved. So I believe that the level of cooperation within the administration on this issue has been high, and it has also been, I think, very professional, and it has been actually a pretty nice experience, believe it or not.

Senator EXON. I hope it comes out well. Let me just ask you to comment along the lines of the question I asked Mr. Wilson. Since you have been intricately involved in this forever, Mr. McClelland, and have a broad background and knowledge of what is going on, do you agree with the statement that I elicited from Mr. Wilson? Do you see from your knowledge any backing down from the administration and its departments to fulfill the commitment and promise that the President made in regard to ethanol?

Mr. MCCLELLAND. No, Sir.

Senator EXON. Thank you.

Mr. Chairman, in closing, just let me say it has been a very interesting hearing. Unlike Senator Grassley, I am not a Baptist. I just want to tell you that I am the designated drive and will be so after this hearing is over.

[Laughter.]

Senator HARKIN. Well, Senator Exon, thank you, both you and Senator Daschle, and I thank in absentia all those who were here earlier and had to leave for your strong support for ethanol and for rural America and for our farmers. I believe this rule is a win-win



for everyone. I do not think anyone loses under this rule. Our environment wins, our economy wins, our Government wins, our farmers win. I am delighted that you asked that question, that there is no backing down, that we will have this rule and we will move ahead expeditiously with it.

I, too, want to commend the Environmental Protection Agency. As I stated, when I said the rule came out in December and now we are this far along, one of the most rapid conclusions of any rule ever promulgated by EPA, and as you said, with over 12,000 comments, more than any other rule ever proposed by the Environmental Protection Agency. So I want to comment you and Ms. Browner for your diligence and your hard work in moving this along as rapidly as you have. I think that is commendable.

And to you, Dr. McClelland, at the USDA, thank you for getting us the kind of studies and information that give us the other side of the story and that put this matter in the proper economic framework. At lot of times we hear, as Senator Daschle mentioned, talk about a tax benefit. But what are the other consequences on the other side of the ledger? And if we are cutting down on farm payments and farmers get a little bit more income and that money stays in this country, then we have to add that into the equation. You have—and I compliment you for that—and we appreciate it very much.

Dr. Graboski, thank you, for being here on short notice. I hope you are able to get out of here this afternoon and get back to Colorado for the long weekend.

Having said that, here is to ethanol. Thank you.

Dr. GRABOSKI. On the other hand, if I do not get back, then I do not have to paint my house.

Senator HARKIN. Well, you can have this bottle of ethanol.

[Laughter.]

[Whereupon, at 12:21 p.m., the subcommittee was adjourned.]



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## A P P E N D I X

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### Statement of Senator Charles Grassley Before EPA

Madam Chair, I begin by submitting for today's record a statement I delivered in the U.S. Senate last November which addresses many issues relevant to today's hearing.

The stakes today are of tremendous importance for the promise they hold for rural America, consumers, urban areas seeking cleaner air, America's energy security, American jobs, and our farm sector.

But it is unfortunate that this hearing is about a side proposal for ethanol, instead of about a proposal to include ethanol in the reformulated gasoline (RFG) program itself.

It is ironic, if not incredible, that the legal authority used by the Environmental Protection Agency for this ethanol side proposal is the same legal authority that could have been used to INCLUDE ethanol in the RFG program.

In fact, this provides the grounds for serious suspicion.

Consider this scenario. Suppose, for a moment, that big oil uses its vast resources in court to hold up or perhaps even kill this ethanol proposal. Can anyone deny that big oil won't try?

If such a ploy succeeded, the oil companies would then be able to "have their cake, and eat it too?" Big oil's multimillion-dollar investments in overseas MTBE plants would remain safe because EPA's RFG proposal virtually mandates MTBE. At the same time, ethanol is locked out completely.

This side proposal makes it too easy for the oil companies. Big oil will no longer worry about risking their MTBE investments by attacking an RFG proposal that included ethanol.

This possibility takes me back to my original point. Why not use this same legal authority and keep MTBE and ethanol in the same RFG "boat?" This would mean that if ethanol sinks, so would MTBE and the multimillion-dollar oil company investments.

Regrettably, the Clinton administration has pushed ethanol out of the RFG boat and has forced it to sea in a separate lifeboat. Oil companies have been given a risk-free shot for their torpedoes.

Obviously, I hope these suspicions are wrong. Yet, if they prove to be accurate, and the oil industry is able to kill this ethanol side proposal, any resulting expressions of astonishment and dismay directed at the oil industry's actions by the Clinton administration and the draftsmen of this proposal will provide little comfort. Moreover, they will ring quite hollow.

I believe there are the means to assure this does not happen. Let me assure everyone today that if I have my way, no stone will be left unturned to assure that if ethanol sinks, so sinks MTBE.



DEPARTMENT OF HEALTH &amp; HUMAN SERVICES

*INSERT 8.76*  
Public Health Service  
(10-14)Centers for Disease Control  
Atlanta GA 30333

August 3, 1993

Timothy R. Gerrity, Ph.D  
U.S. Environmental Protection Agency  
Clinical Research Branch  
Human Studies Division/MD-58  
Health Effects Research Laboratory  
Research Triangle Park, North Carolina 27711

Dear Dr. Gerrity:

Enclosed are two interim reports that describe epidemiologic investigations conducted by the Centers for Disease Control and Prevention (CDC) on human exposures to methyl tertiary butyl ether (MTBE) in Fairbanks, Alaska, and Stamford, Connecticut. These reports are still in a preliminary stage, and are not to be cited or distributed. The investigation from Albany, New York, is still incomplete, as we are still awaiting worksite air data and personal monitoring data. We will be faxing a draft copy of this report to you tomorrow.

We appreciated the opportunity to collaborate with the EPA on these investigations which concern an issue with great public health implications. I believe that we all can be proud of the tremendous amount that has been achieved in just a few short months. Several agencies pooled their resources to design and implement three different epidemiologic investigations regarding MTBE exposure and possible health effects. CDC's unique contribution to this effort included the expeditious conduct of epidemiologic field investigations in collaboration with state and local health authorities, and the analysis of low levels of volatile organic compounds in the blood of both occupationally exposed and nonoccupationally exposed subjects.

Our major findings were:

1. In areas where MTBE was added to gasoline MTBE was detectable in the blood of both occupationally exposed subjects and the general public.
2. Subjects with higher blood levels of MTBE more frequently reported symptoms, including headache, nausea, burning of the nose and throat, and spaciess, compared to those with lower blood levels of MTBE.

Page 2 - Dr. Gerrity

3. Gasoline exposures alone did not seem to account for the increased symptom prevalence in people exposed to MTBE.

We believe it is important to keep in mind the limitations of these studies. All of the studies used convenience samples, which may not be representative of the general populations. The study subjects in the different studies were recruited in slightly different ways, at different times of the year, and in different seasons. For this reason the prevalences of symptoms between the studies may **not** be directly comparable.

We hope these preliminary reports will be helpful to you. We believe they raise questions which must be resolved in future investigations. Please contact us if you have any other questions or concerns that we can address. We can be reached at (404) 488-7320.

Sincerely,



Ruth A. Etzel, M.D., Ph.D.  
Chief  
Air Pollution and Respiratory  
Health Branch  
Environmental Hazards and  
Health Effects (F39)  
National Center for Environmental  
Health

Enclosures

cc: Stephen Thacker, M.D., M.Sc.  
Henry Falk, M.D., M.P.H.




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**OXYGENATED FUELS ASSOCIATION, INC.**


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The Honorable Tom Harkin  
 Chairman, Subcommittee on Nutrition  
 and Investigations  
 Senate Committee on Agriculture  
 SR 328A Russell Senate Office Building  
 Washington, D.C. 20510-6000

Re: Hearing Regarding the Renewable Oxygenate Standard,  
 May 27, 1994

Dear Senator Harkin:

On May 27, 1994, we understand that the Subcommittee on Nutrition and Investigations held a hearing regarding the renewable oxygenate standard proposed by the Environmental Protection Agency under its reformulated gasoline program. Because the Oxygenated Fuels Association did not participate in that hearing, we appreciate this opportunity to present information for the the hearing record.

**1.0 The Oxygenated Fuels Association, Inc.**

Formed in 1983, the Oxygenated Fuels Association, Inc. ("OFA") is a national trade association that represents companies involved in the production and distribution of oxygenate fuel additives used in gasoline. OFA members produce the full range of oxygenate ethers --- including ETBE, MTBE, TAEF, and TAME. In the past, OFA has acted as a resource for technical assessments of various EPA regulatory programs. This Report represents our views on the renewable oxygenate requirement ("ROR") promulgated by the Environmental Protection Agency ("EPA") on December 27, 1993.

As producers of oxygenates, OFA members strongly support the timely implementation of the Clean Air Act program requiring reformulated gasoline ("RFG") to be sold by January 1, 1995 in all areas covered under the Act. Further, we commend the EPA for seeking to establish common ground with stakeholders through its regulatory negotiation process, and we fully support the decision of EPA to promulgate the RFG program as a final rule. We believe it is wise for the federal, state, and local governments to seek broad implementation of the program, including "opting in" to maximize the benefits of the program.

**2.0 Introduction**

Like the EPA, OFA recognizes the substantial advantages to oxygenates in gasoline. The environment gains because

OFA Letter to Senator Harkin  
 June 3, 1994  
 Page 2

oxygenates reduce volatile organic compounds, air toxics, nitrogen oxides, and other emissions. Also, the use of both ETBE and MTBE reduce so-called greenhouse gas emissions by substituting feedstocks with reduced carbon contents. Just as ETBE creates a market for some renewable sources of energy, MTBE bolsters demand for natural gas, thereby stimulating market conditions conducive to further domestic natural gas production and development. Oxygenates also reduce dependence on foreign sources of oil.

Clearly, all oxygenates have benefits, and all have particular market strengths. OFA, therefore, cannot support the proposed EPA intervention into the oxygenate market because it favors one type of oxygenate over another. Even as Congress used its broad legislative authority to establish an RFG program, it did so in the belief that its policy would be neutral as to the market share for each oxygenate. While OFA is cognizant of the regulatory complexities posed by the Clean Air Act, our support for free market principles and opposition to guaranteed market share for one product or technology echoes the explicit recommendation of Vice President Gore's National Performance Review of last year:

"Rather than dictating exactly which technologies industry should use to reduce pollution, the government would set standards and let the market handle the details."

National Performance Review 63 (1993).

OFA's position is based on four principles: (i) oxygenate neutrality under the Clean Air Act is essential; (ii) administrative market share requirements for renewable oxygenates are unnecessary; (iii) administrative market share requirements are counterproductive; and (iv) other alternatives may be preferable to EPA's approach.

### **3.0 Oxygenate neutrality essential**

The Clean Air Act Amendments of 1990 are the result of years of Congressional compromise and many principles of the free market with a desire for oxygenate diversity. The result of this carefully balanced compromise is oxygenate neutrality as

OFA Letter to Senator Harkin  
 June 3, 1994  
 Page 3

reflected in both the statutory language and legislative history of the Amendments.<sup>1</sup>

Because of the complexity of the modelling involved to implement an RFG requirement, the EPA brought together a regulatory negotiation, or reg-neg, of the oil industry, the ethanol industry, other oxygenate manufacturers, state-local officials, and representatives of environmental groups. While EPA is to be commended for retaining the environmental protection implicit within reg-neg's emissions requirements, EPA should be cognizant that the compromise of oxygenate neutrality was an organizing principle of the reg-neg as well.

By rejecting oxygenate neutrality, EPA violates not only the agreements reached under the reg-neg but also the requirements of the Clean Air Act ("CAA"). It creates a greater interference within the competitive marketplace and sets a precedent adverse to industrial cooperation with future reg-neg's. Further, EPA simply lacks the authority under the Clean Air Act to promulgate this rule because Congress enacted strict oxygenate neutrality requirements for reformulated fuels.<sup>2</sup> Therefore, by challenging key principles of the reg-

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<sup>1</sup> Section 211(k)(1) of the CAA states:

Within 1 year after the enactment of the Clean Air Act Amendments of 1990, the Administrator shall promulgate regulations under this section establishing requirements for reformulated gasoline to be used on gasoline-fueled vehicles in specified nonattainment areas. Such regulations shall require the greatest reductions in emissions of ozone forming volatile organic compounds (during the high ozone season) and emissions of toxic air pollutants (during the entire year) achievable through the reformulation of conventional gasoline, taking into consideration the cost of achieving such emission reductions, any nonair-quality and other air-quality related health and environmental impacts and energy requirements.

42 U.S.C. § 7545(k)(1) (1993) (emphasis added).

By using "such regulations" in the statutory language, Congress intended that the second sentence qualify the first sentence of this provision. In interpreting this provision as a whole, the plain language of section 211(k)(1) does not give the EPA the authority to pursue any energy policy objective that it considers desirable. Rather, EPA may only take "energy requirements" into consideration in the context of promulgating regulations achieving the "greatest reductions in emissions of ozone forming volatile organic compounds...and toxic air pollutants." Thus, EPA has no authority based on statutory language to promulgate regulations which have nothing to do with achieving VOC and toxic air emission reductions.

<sup>2</sup> In one of the Agency's own documents, the Final Regulatory Impact Analysis for Reformulated Gasoline, EPA is on record declaring that "EPA has no legal authority under the Clean Air Act to provide such a mandate for the use of ethanol." Further, EPA also lacks authority to regulate emissions of carbon dioxide and other greenhouse gases either under other statutory frameworks or under the United Nations Framework Convention on Climate Change, as ratified by the Senate. If potential greenhouse gas emissions reductions justify this EPA mandate, then there is nothing to prevent EPA from



OFA Letter to Senator Harkin  
 June 3, 1994  
 Page 4

neg in a separate proposed rule and rejecting oxygenate neutrality, EPA creates the very confusion and regulatory uncertainty that the reg-neg process was designed to alleviate in the first instance and opens the entire process to legal challenges of EPA's authority that could delay the entire RFG program.

#### 4.0 Administrative market share requirements unnecessary

EPA has taken the position that much is to be gained from diversity in oxygenate sources. However, OFA would respectfully submit that oxygenate neutrality is not inconsistent with fuel diversity. In reality, there is no need for rigid and inflexible administrative requirements to ensure ethanol and ETBE a place in the oxygenate marketplace. According to the most recent 12 months of oxygen supply data, ethanol-derived oxygen has about a 50% share of the motor fuel oxygen market. The gasoline oxygen supply is split evenly between ethanol and methanol sources.

According to the Preamble of the December 27 Proposed Rule, EPA received comments indicating that the reg-neg had frozen ethanol and ETBE out of participation in the RFG program. These arguments are baseless. While economics may discourage direct blending of ethanol to summer Southern grade RFG, there is no technical reason why ethanol cannot be blended with low Reid vapor pressure ("RVP") base stocks ("RBOE") to make RFG, either Southern or Northern grades. In addition, ethanol's route into the RFG program through ETBE can be advanced by clarifications within the Tax Code, as described below. In short, the ability to blend ethanol in conventional gasoline and the current interpretation of the Tax Code are far closer to obstacles to ethanol's use in RFG --- as opposed to the factors EPA addresses in the Proposed Rule.

#### 5.0 Administrative market share requirements counterproductive

In place of oxygenate neutrality, EPA's proposed rule creates an administrative market share requirement requiring a set-

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requiring that all motor fuel, not just all reformulated fuel, contain a renewable component or that industrial boiler and utility power plant purchases require renewable fuels or switch from higher greenhouse gas emitting fuels and processes.

OFA Letter to Senator Harkin  
 June 3, 1994  
 Page 5

aside for thirty (30) percent "renewable" oxygenates, which it believes will include ethanol and the ethanol ether, ETBE. Such an approach endangers the RFG program.

### 5.1 Untested assumptions

The assumptions underlying the renewables proposal have never been tested. While years of commitment to an open market in fuels underscores oxygenate neutrality, the economic impacts and changed incentives created by the EPA's approach have never been studied. For example, although EPA hopes that the fortunes of the agricultural sector will rise, no data proves that a benefit to ethanol "trickles down" to the farm economy.

### 5.2 Reliance on "food crops" for energy

Concrete past examples raise serious doubts concerning an administrative renewables requirement. Analysis by the U.S. Department of Energy rejected basing energy security on a "food crop". Food is an essential commodity, the price of which is established by worldwide demand. If droughts were to reduce supply or if demand were to increase (or if both were to occur), the U.S. economy would have to brace for unforeseen and severe energy price shocks.

Indeed, the most recent data indicates that corn prices are currently at a 5½ year high and that corn inventories are at the lowest levels since the 1940's, mostly as a result of the severe Mid-west floods of 1993. Given the 9.48 billion bushels produced in 1992 (a more representative year), if corn prices were to increase just five percent over the \$2.50 per bushel price as a result of this proposal, the adverse impact on food prices would be \$1.125 billion.

Brazil provides an alarming example. With fuel production based upon sugarcane fermentation, Brazil was unprepared for sudden increases in world sugar prices. Because ill-advised regulations tied Brazilian energy producers to sugar, the results were extreme inflation in fuel prices and, ironically, increased imports to satisfy domestic demand priced out of the market.

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<sup>3</sup> In the United States, the Disposal of Distillers' Dried Grain Solids ("DDGS"), an ethanol byproduct, is already showing signs that it may either limit ethanol production or drive up ethanol prices.

OFA Letter to Senator Harkin  
June 3, 1994  
Page 6

### 5.3 Inappropriate EPA arguments

The Clean Air Act Amendments suggest health and environmental criteria for forcing choice among RFG ingredients, and EPA may also consider energy efficiency. In the case of its renewables mandate, EPA achieves no additional environmental or health benefit, and its energy objective is unrelated to the renewability of oxygenates.<sup>4</sup>

EPA argues that its renewables mandate will reduce the level of U.S. oil imports. In reality, artificially stimulating ethanol use is unlikely to actually reduce reliance on imported oil. While the EPA indicates a crude oil savings of 9,000 bbls/day, the U.S. Department of Energy conducted a study that demonstrates that increased reliance on renewable oxygenates "increases slightly" the use of crude oil. Even if EPA's estimate is correct, the cost of this savings of imported oil works out to an astounding \$103.50 per barrel, given the \$340 millior. EPA expects the Highway Trust Fund to lose as a result of the requirement. When consumer costs<sup>5</sup> are added, the total cost per barrel saved rises to \$118.00.

EPA also attempts to justify the renewable oxygenate mandate based on the argument that increased ethanol/ETBE usage would back out imported MTBE. However, worldwide MTBE economics shows the most likely effect could be to back down domestic MTBE production, not imports.

Under our minimum oxygenate demand forecast for 1995, a 30% renewables mandate would require about 50,000-55,000 bbls/day of ethanol (or 100,000 bbls/day of MTBE equivalent) with about 230,000-250,000 bbls/day of MTBE required. U.S. MTBE production capacity is projected at about 255,000 bbls/day but it is strongly anticipated that 40,000-50,000 bbls/day of MTBE will be imported. The U.S. currently imports 20,000-25,000

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<sup>4</sup> This proposal has nothing to do with achieving "the greatest reduction in emissions" of VOCs or toxic air pollutants. Rather, the reformulated gasoline rule itself assures air quality, and this mandate could harm the environment through delays in the implementation of the RFG program itself. Further, an argument can be made that an ethanol mandate could reduce air quality in the winter months because of the alcohol coningling and concomitant increase in RVP that will be encouraged by this proposal.

<sup>5</sup> This estimate is conservative because it does not take into account state tax credits for ethanol and the costs of storage, distribution and enforcement required by this proposal. Further, EPA estimates that the direct annual cost to motorists of this proposal would be \$48 million.

OFA Letter to Senator Harkin  
June 3, 1994  
Page 7

bbls/day and at least two new worldscale plants will be on-stream with much of that product destined for the U.S. market.

Since the East Coast will be the primary oxygenate market in the U.S., Gulf Coast and offshore producers will be targeting shipments to that area. Worldwide product prices and foreign governmental incentives will create feedstock advantages for those imports. Offsetting the feedstock advantage would be freight and duty on the imports (about 6-8 cents per gallon and 4-5 cents per gallon, respectively). However, an additional cost to U.S. Gulf Coast producers is the freight to the East Coast (4-5 cents per gallon). Thus, once plants are built and producers are competing for markets, non-U.S. producers may have a cost advantage over U.S. Gulf Coast producers in delivering product to the primary market.

While the U.S. exported 2,300 bbls/day of ethanol in 1990, it is currently importing 8,000 bbls/day of ethanol according to the foreign trade listings of the U.S. Department of Commerce. If expanded ethanol use merely traded off with domestic MTBE production instead of imports, the perverse result could be increased U.S. energy imports in the long-run and lost U.S. jobs.

In any event, the conclusion that a regulatory market share for renewable oxygenates can be justified on grounds of reduced reliance on foreign sources of energy is tenuous at best.

#### **5.4 Damaging effects of increased ethanol demand**

The renewable oxygenate mandate will also be counterproductive because of the effects in the marketplace caused by an increase in the demand for ethanol (estimated at 600 million gallons per year). At present, minimal capacity among existing ethanol plants is available to meet this new demand, and insufficient lead time exists for the development of new capacity and the debottlenecking of existing plants to be brought on line. Thus, because EPA's proposal will create a huge spike in demand that can only be met with existing capacity, the promulgation of an ethanol mandate will create large, disruptive increases in ethanol price as well as a damaging shift of ethanol use away from existing markets.

For instance, the demand spike will force refiners to bid away ethanol supplies from existing markets thereby hurting small

OFA Letter to Senator Harkin  
June 3, 1994  
Page 8

businesses that rely on ethanol's economics to remain competitive. Because these markets represent very low margins for ethanol producers, these blending operations may be permanently shut down, leading to a loss in jobs as well as reducing the future growth in ethanol use EPA hopes to achieve.

Further, this situation will be disruptive to MTBE producers, many of whom have only recently built new plants to meet the needs of the CAA. The proposal to close off access to 30% of the RFG market will, in effect, reduce the total demand for MTBE. The low value, extender markets abandoned by ethanol suppliers because of the demand spike will not become opportunities for MTBE. Thus, MTBE producers will suffer a decline in price and margin.

The higher price of ethanol caused by the demand spike will also negatively impact MTBE producers. Ether producers who might shift to ETBE production will find it unattractive to do so because the increase in ethanol feedstock cost will disrupt the market for this product as well.

ETBE's value is very sensitive to the cost of ethanol, and any upward movement in ethanol pricing will also increase the cost of ETBE. This would make it more economical for refiners to blend ethanol in the non-ozone control periods and use their oxygen credits to enable them to blend non-renewable oxygenates during the VOC control periods.

Development of the ETBE market would also be threatened by the short leadtime being provided by EPA. Beyond the work needed to convert existing plants, marketers require leadtime to put supply contracts in place as well as to negotiate contracts with refiners. The uncertainty created by the timing of this rule will make it difficult for marketers to develop this business, further diminishing ETBE's role in RFG.

By not allowing the leadtime necessary for the industry to adjust to the full demand potential of this proposal, EPA may lose any benefits it hopes to gain from the increased use of ethanol as a renewable fuel. Disrupting existing market by creating a situation where the demand resulting from this proposal would be met through a shifting of ethanol from existing low value markets to new RFG areas will make future capacity additions difficult to justify and finance. If new

OFA Letter to Senator Harkin  
June 3, 1994  
Page 9

capacity is not able to come on line the benefits EPA hopes to gain will be foregone.

Disrupting the existing marketplace will force refiners to seek solutions that are uneconomical, increasing the cost to consumers, as well as making it difficult for the marketplace to find the most optimal path for bringing renewable oxygenates into place. EPA should focus on other options that rely on the free-market wherever possible to meet its goal of achieving appropriate air quality standards under the CAA.

#### 5.5 Problems in the ether manufacturing process

The denaturant used in ethanol can also create problems in the ether manufacturing process. It would be best if the alcohol is denatured as it is converted to an ether (i.e., no denaturant added at the ethanol plant). However, the Bureau of Alcohol, Tobacco, and Firearms ("BATF") is not comfortable allowing pure ethanol shipments from the Upper Midwest ethanol production center to the Gulf Coast etherification center. While ETBE itself might be a good denaturant, BATF must accept it and it must be backhauled to the ethanol plants.

The reaction kinetics of ethanol versus methanol conversion are such that the olefin conversion may decrease significantly. This reduces the ability of the etherification industry to fix oxygen atoms into the ether products needed for reformulated gasoline and the oxygenated fuels program. Member companies report that isobutylene conversion to ether may drop from 98% to 90% per pass for about an 8% capacity reduction, and etherification may experience a similar conversion decline. But, the conversion loss is worse for the environment because the unconverted amylenes (olefins) report to gasoline blending rather than being recycled to extinction or alkylated as are the butylenes. Most of the conversion losses can be recovered by adding catalytic distillation to the ether plants but that requires lead time and money that EPA has not built into the ROR.

Due to differences in distillation characteristics, the ether products may contain up to 5% unconverted ethanol. This means there could be over a half of a percent of ethanol (versus less than 100 ppm methanol) in reformulated gasoline as it leaves the refinery. EPA's enforcement guidelines need to allow for this. Pipelines have to be told to accept this product and oxygen concentrations should be higher as the

OFA Letter to Senator Harkin  
June 3, 1994  
Page 10

product leaves the blender to allow for alcohol losses to tank bottoms water draw off (disposal of which may in itself be a problem). Given time and money, the ethanol contamination can be reduced to less than 2%.

Because ethanol will tend to be wet when it gets to the etherification facility, the ether product will also be contaminated with up to 3% Tertiary Butyl Alcohol ("TBA"). TBA will generate the same distribution problems as ethanol contamination and will also need to be accommodated by EPA. This problem can also be alleviated with time and money by drying the ethanol before etherification.

The cost of the necessary ether plant modifications is estimated to be in the \$350-400 per barrel of daily ether capacity range. The engineering and fabrication of the necessary modifications only require about six months. However, permitting lead time and typical maintenance schedules need to be accommodated. The installation of the equipment will require about a two week down time and having a separate shutdown will add to the cost. We suggest that the effective date of the ROR be no sooner than January 1, 1998 in order to allow for permitting, engineering, construction, fabrication and installation of the needed ether facility modifications. Such a lead time would be consistent with the complex model lead times agreed to in the reg-neg and would allow EPA to monitor ethanol's market share in reformulated gasoline before burdening the industry with even more paperwork.

#### 5.6 Costs to the consumer

As we have emphasized, the ROR imposes costs upon the consumer directly (through increased RFG prices) and indirectly (through losses to the Highway Trust Fund and potential increased food costs). Resources for the Future, an energy and environmental study organization, recently reviewed the literature regarding the ROR. The report's author, former Assistant Energy Secretary for Policy Vito Stagliano, found that:

"The proposal's economic impacts seem fairly clear: consumers in the Northeast and California will pay at least 7 cents per gallon more for gasoline than would be the case without this proposal. EPA provides no persuasive evidence that the oxygenate

OFA Letter to Senator Harkin  
 June 3, 1994  
 Page 11

it proposes to mandate into the market will provide greater ozone benefits than could be obtained by available, more economic and non-subsidized alternatives."

The Impact of a Proposed EPA Rule Mandating Renewable Oxygenates for Reformulated Gasoline, RFF Discussion Paper No. 94-17 (February 1994) at 13.

#### **6.0 Other options better satisfy EPA's objectives**

If EPA believes that additional diversity in oxygenates will enhance the RFG program, numerous options should be pursued.

As EPA has often realized, major regulatory actions must consider diverse and competing objectives. Therefore, before any approach is embraced, EPA should satisfy several criteria. First, any proposal must be the result of careful analysis and must rely upon an adequate database. Second, any proposal must insure oxygenate neutrality. Any deviation from this important predicate must be authorized by legislation adopted by Congress and signed by the President. Third, the process which produces such a proposal must be an open one, subject to full notice and comment, and peer review. And fourth, any proposal must be sufficiently flexible to respond to unforeseen circumstances. Any proposal that fails to meet these criteria would be ineffective and injurious public policy.

OFA believes that the reg-neg provided a flexible and pragmatic approach to the RFG program. However, a range of options could be considered by the Administration and Congress that also deal with the market share of oxygenates under the RFG program. These options include permitting an interpretation of the Tax Code under which the renewables tax credit can be claimed at the point of manufacture of ETBE.<sup>6</sup>

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<sup>6</sup> Currently ethanol enjoys the full benefit of the renewable fuel alcohol tax credit through the excise tax incentive available to it. Refiners who desire to blend ETBE do not enjoy this access, nor can they always take advantage of the blender income tax credit which is available to ETBE because of limited usable tax liability associated with low profit margins. This economic uncertainty will continue to limit, if not prevent, the use of ETBE. OFA's understanding of the Tax Code is that the Administration can correct this problem by including ETBE as a qualifying fuel mixture eligible for the blender income tax credit. This would allow producers of ETBE to take advantage of the existing tax credit to offset the high cost of ethanol. This action should be revenue neutral, since it would not create any new incentives for ethanol use, and thus readily can be done by the Administration.



OFA Letter to Senator Harkin  
June 3, 1994  
Page 12


Another option for expanding the use of oxygenates in gasoline exists within the Comprehensive National Energy Policy Act of 1992. This law, designed to increase our nation's energy independence, failed to include the oxygenate portion of RFG as a qualifying alternative fuel. Such a legislative change could dramatically increase the potential market for oxygenates, benefiting both ethanol and other domestic oxygenate industries. Indeed, given the broad implications of dealing with renewable energy sources, perhaps the energy security needs of the U.S. are best evaluated within the context of national energy policy. We believe that any option EPA may ultimately consider should meet the criteria suggested above.

#### 7.0 Conclusion

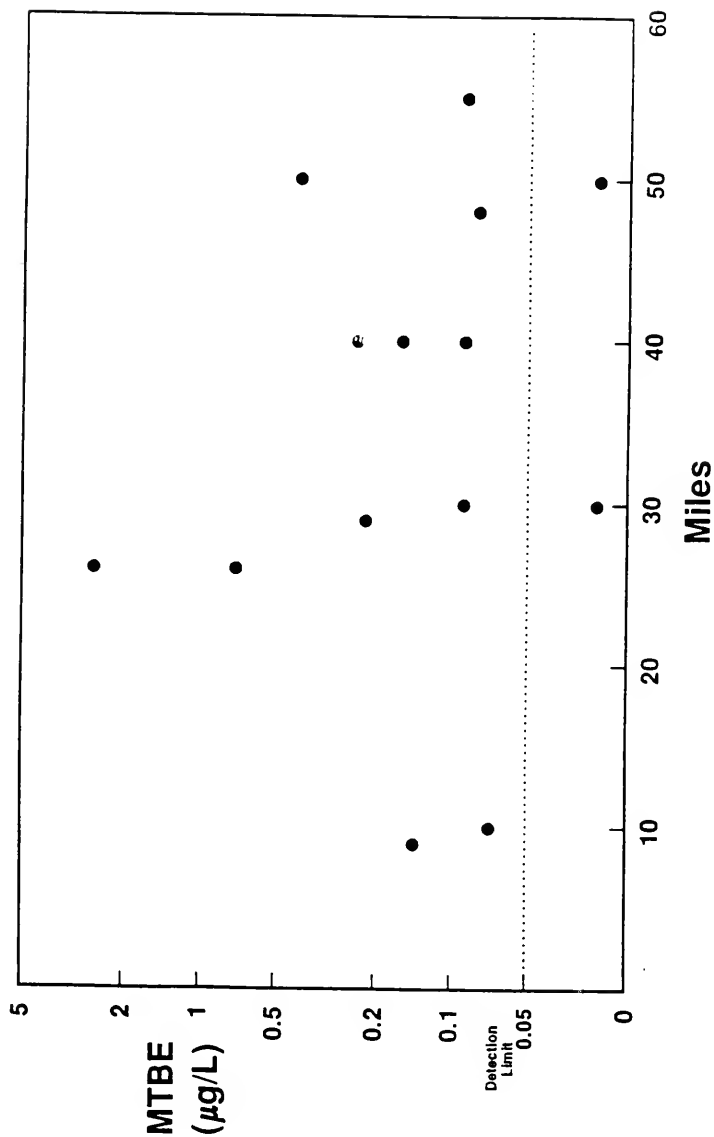
The task ahead for EPA is of great significance for the economy and the ecology. When the reformulated gasoline program is fully implemented, it will be among the largest product introductions in history, simultaneously affecting at least 30 percent of the gasoline supply. The environment, consumers, and industry have much to gain from this pioneer effort. However, by promulgating a renewable oxygenate requirement that is counter to the reg-neg and the Clean Air Act, EPA may strip the RFG program of much of the flexibility needed to make this effort a reality.

Thank you for interest in this vital matter. If you or your staff has further questions regarding the ROS or other aspects of the federal RFG program, please do not hesitate to contact OFA directly.

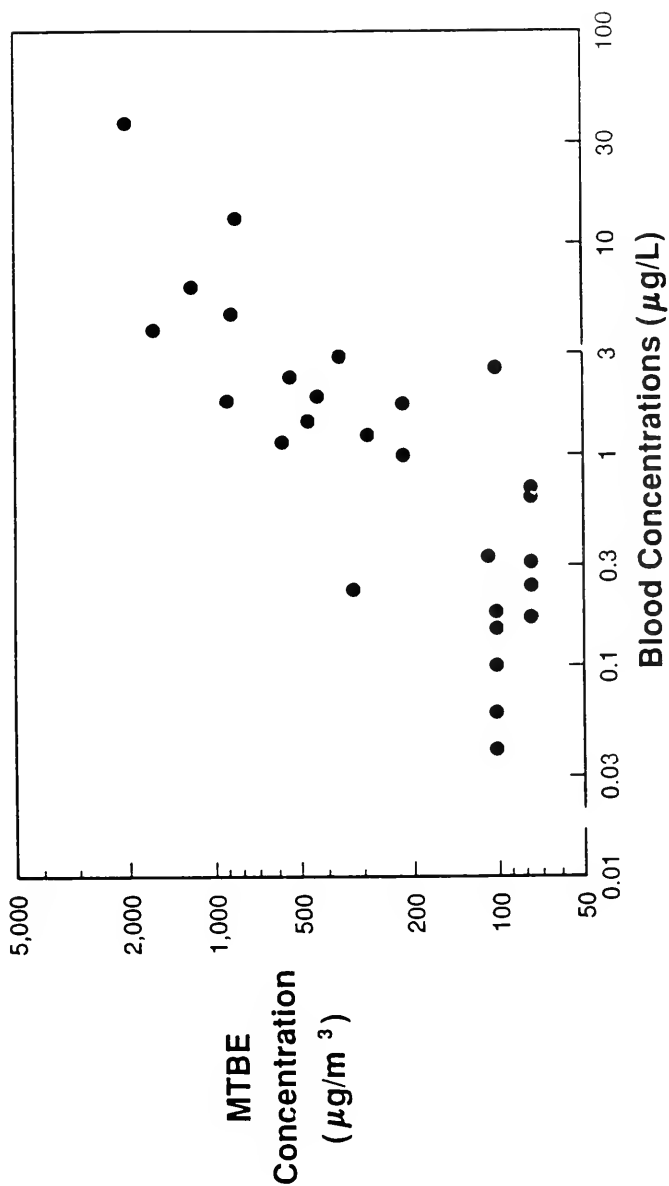
Very Truly Yours,

  
Winfred O. Craft, Jr.  
Executive Director

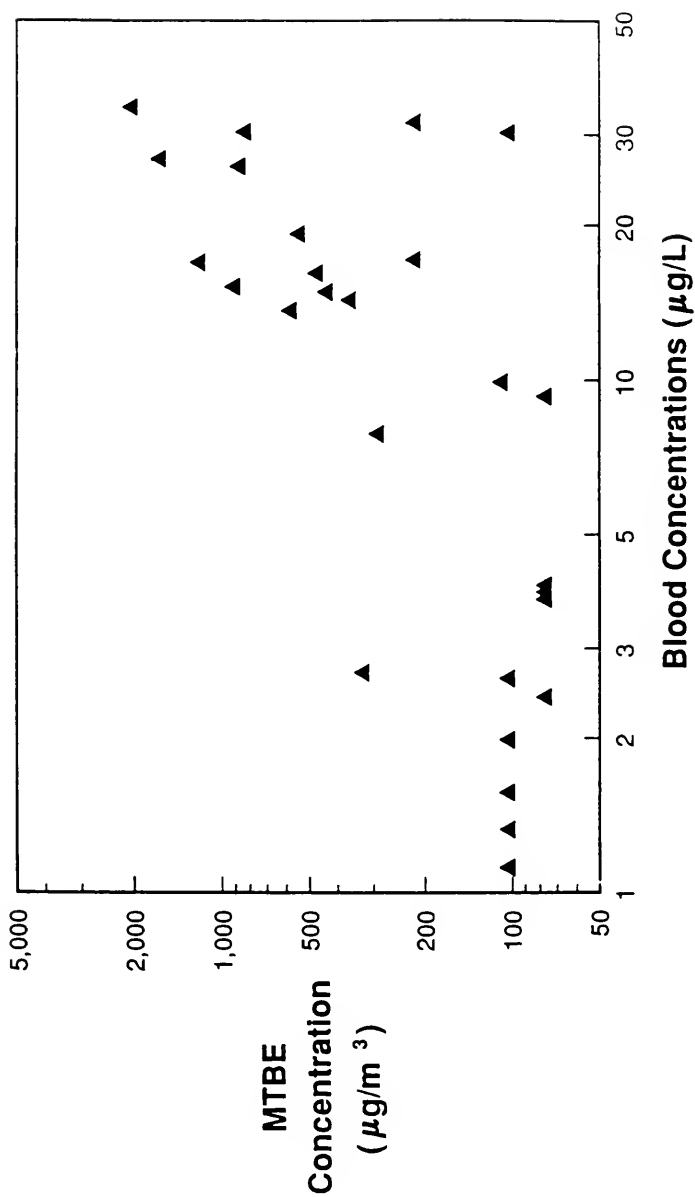
**Figure 3. Blood Levels of MTBE and Number of Miles Driven to Work that Morning Among Commuters**



**Figure 4. Blood Levels of MTBE and Personal Breathing Zone Concentrations of MTBE**



**Figure 5. Blood Levels of TBA and Personal Breathing Zone Concentrations of MTBE**



over a million people between 1975 and 1978 in the name of "social restructuring." In October, Khmer Rouge military commanders tried to force 43,000 Cam-

*The Washington Times*

## EPA flunks science

The Environmental Protection Agency's research budget is scheduled to rise nearly 50 percent from fiscal 1991 to fiscal 1992. But congressmen like George Brown think the agency deserves even more money. Why? Because the agency is doing such a lousy job with the money it now receives.

Just how lousy was evident from a scientific panel released earlier this month. At the request of EPA chief William Reilly, a group of scientists studied the agency's Office of Research and Development to determine how EPA could "meet the goal" of using "sound science" to formulate its policy decisions. The scientists held three public meetings, interviewed more than 30 people familiar with agency operations and took comments from 25 more.

The panel's final report card makes it pretty clear EPA is not exactly among the gifted and talented. The scientists found, among other things:

- EPA does not have a coherent science agenda.
- People inside and outside the agency believe that EPA policy dictates its science.
- EPA carries out studies without the benefit of peer review or "quality assurance." These studies turn into regulations with little scientific basis and hurt the credibility of the agency.
- The agency does not scientifically evaluate the impact of its regulations.
- EPA's interpretation and use of science is "uneven and haphazard."

requested to be seated in the western part of Cambodia. After all, that is still the part closest to the relative safety of the Thai border.

■ The agency has failed to make clear that scientific uncertainties make it hard to provide definitive "yes" or "no" answers to policy questions.

In short, the Expert Panel on the Role of Science at EPA didn't find very much science. There's a good reason for this shortcoming that has less to do with the agency itself than with the regulatory functions Congress has assigned to it. "[M]ost of our current knowledge concerning how humans respond to environmental pollutants," said the panel, "comes from research with laboratory animals under conditions very different from those that humans actually experience. Many uncertainties, therefore, are involved in deducing how the information gained through this laboratory research applies to people."

In other words, there is no "sound science" on which to base many of EPA's regulations. There are only man-animal extrapolations in which scientists expose lab rats to high doses of toxic chemicals in hopes of figuring out what disappearing small doses would do to humans. The panel warned that without sounder science, the agency would spend time and money dealing with high-profile, low-risk problems while ignoring real health problems. The agency's preoccupation with killer apples is just one example.

Mr. Miller and Mr. Reilly can reward poor performance with more funding. They can hire more people, issue more reports, impose more regulations. But in the end, unfortunately, it won't mean more science, just more EPA.

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## United States Senate

CHARLES E. GRASSLEY

WASHINGTON, DC 20510-1501

May 12, 1994

### REPLY TO

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The President  
The White House  
Washington, D.C. 20500

Dear Mr. President:

It is imperative that you call upon the Environmental Protection Agency to immediately issue its final regulations on your Renewable Oxygenate Standard (ROS), and that you insist upon no further erosion of ethanol's role in the reformulated gasoline program (RFG).

With my testimony before EPA earlier this year, I warned that by separating ethanol out of the RFG program, thus breaking the tie with the oil industry's MTBE (which now enjoys a virtual mandate by the RFG), your ROS left the future of ethanol in a procedurally vulnerable position. Your RFG/ROS proposals gave the oil industry and its allies in the federal government a free shot at destroying ethanol through both the regulatory and later the judicial processes.

You used the same legal authority for ROS that would have allowed you to INCLUDE ethanol in the RFG. To avoid risking its heavy investments in new MTBE plants, the oil industry would have had to accept an RFG with ethanol.

Instead, we have seen the huge treasuries of the oil industry mount a non-stop, deafening drum beat of anti-ethanol propaganda through the media and through their friends in Congress. And if they can't kill ethanol before EPA, they'll use their resources to do so in the courts.

It did not have to be. The RFG should have included ethanol.

The oil industry's propaganda includes the worn arguments that ethanol treatment is unjustified. Primarily, opposition evokes concerns about mandates and tax breaks for ethanol. They argue it is all unfair, of course.

I learned long ago, however, that mandates, tax breaks and subsidies are only "bad" if they do not benefit the oil industry, and instead benefit the industry's competition.

Therefore, to force an honest debate over ethanol, I think we should consider the possibility of eliminating all subsidies and tax benefits dealing with energy.

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44

For instance, in view of our ever-increasing reliance upon foreign oil, should we continue giving our oil industry the billions of dollars in foreign tax credits? The most recent income and tax return data covering July, 1990 through June, 1991, reveals that the petroleum industry paid only \$5.5 billion in income tax on well over \$537 billion in receipts. One reason their taxes were so low is that they received over \$5.3 billion in foreign tax credits.

In 1987, it was worse. The petroleum industry paid Uncle Sam a mere \$665 million in income taxes, while they took over \$7 billion in foreign tax credits to pay foreign governments and oil sheiks.

This year the Congressional Budget Office identified the repeal of expensing of intangible drilling, exploration, and development costs, as well as the repeal of percentage depletion, both of which are special tax benefits given to petroleum and mineral companies, but generally not other taxpayers. CBO found the repeal of these laws would recover \$11 billion over five years, otherwise lost to the Treasury.

The energy industry as a whole enjoys very large subsidies in addition to tax breaks. Perhaps we should update a thorough analysis produced 10 years ago by the Rocky Mountain Institute.

On June 20, 1985, a representative from the Institute presented its findings to the House Energy and Commerce Committee. I am enclosing a copy of this testimony.

In short, it found that in FY 1984 alone, the Federal government provided over \$46 billion in energy subsidies through tax benefits, agency assistance, loans, as well as direct subsidies. (Isn't that about the same amount that Ways and Means Chairman Rostenkowski is seeking to pay for health care reform?)

It is instructive to note that the oil and gas industry received \$8.581 billion in subsidies, while the ethanol gasoline excise tax exemption totaled a mere \$251 million.

Moreover, during the debate of the National Energy Security Act of 1991, Senate Energy Committee Chairman Bennett Johnston revealed that the oil industry enjoys a huge, backdoor import subsidy of almost \$200 per barrel. And thanks to a request by former Congressman Alexander from your state of Arkansas, the GAO found imported gasoline is subsidized at about \$3 per gallon.

So as we endure this endless drumbeat of anti-ethanol propaganda, our attention should focus more and more on the question of doing away with all energy subsidies.

The oil industries attack on the ROS as a "mandate" is equally weak. First of all, the RFG is a pro-oil industry MTBE mandate.

Second, the oil industry throughout our history has reaped handsome profits from government mandates. For instance, during the late

1950's, the oil industry demanded from Congress and the President, a mandate to protect the domestic oil industry from foreign competition. Their justification was the argument that to rely upon foreign oil for 10 percent of our energy jeopardized our national security.

Today our dependence upon foreign oil hovers around 50 percent (and some predict it will soon reach 75 percent), but you don't hear the oil industry talking about national security to support domestically produced alternative fuels such as ethanol. They seem to only talk about national security when they want additional tax breaks, or when they want to open up Alaska for further exploration.

Mr. President, in a short time, it will have been two years since former President Bush announced a resolution to the question of the use of ethanol in the RFG. You said you would do better.

As a Republican, I realize that with Congress and the Administration controlled by the Democratic Party, my appeal for ethanol may not rate as one of your priority concerns. But I ask your help not for myself. I ask it for the years we have worked to encourage the use of a domestically produced alternative to OPEC oil. I ask it for the hundreds of thousands of farmers and laborers in rural America whose livelihoods depend upon the growth of our ethanol markets. And I ask it in the name of cleaning up our air for this and future generations.

I frankly cannot count the times I have sent letters, presented testimony, and given speeches emphasizing the importance of a large ethanol role in the RFG. If you carry out your promise for ethanol, I need speak out no more on this vital matter.

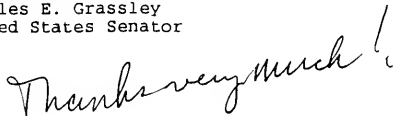
Thank you in advance for your serious attention and assistance.

Sincerely,



Charles E. Grassley  
United States Senator

CEG/cc  
Enclosure





Submit for  
5/12/94 Caran  
UNITED STATES SENATOR • IOWA

# CHUCK GRASSLEY

## PRESS RELEASE

FOR IMMEDIATE RELEASE  
Thursday, May 12, 1994

CONTACT: Caran McKee  
202/224-3744

GRASSLEY REFUTES ANTI-ETHANOL PROPAGANDA  
ASKS PRESIDENT CLINTON TO DECIDE NOW  
SUGGESTS END TO BIG OIL SUBSIDIES

In response to the oil industry's "non-stop, deafening drum beat of anti-ethanol propaganda," Senator Chuck Grassley (R-IA) today called upon President Clinton to "carry out your promise for ethanol" and "call upon EPA to immediately issue its final regulations on your Renewable Oxygenate Standard (ROS)."

In today's letter to the President, Grassley also argued "to force an honest debate over ethanol" we should consider ending all energy subsidies, which, according to a 1985 analysis, amounted to over \$46 billion - "about the same amount that Ways and Means Chairman Rostenkowski is seeking to pay for health care reform."

The study found that the oil and gas industry enjoyed over \$8.581 billion in federal subsidies in one year alone. In sharp contrast, the ethanol gasoline excise tax exemption amounted to \$251 million.

The letter to the President, a copy of testimony regarding the study, and a letter to Senate Energy Chairman Johnston are attached.

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## United States Senate

CHARLES E. GRASSLEY

WASHINGTON, DC 20510-1501

## REPLY TO

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(712) 322-7103

May 12, 1994

The Honorable Bennett Johnston  
Chairman, Senate Energy Committee  
Room 304 Dirksen  
Washington, D.C. 20510

Dear Chairman Johnston:

Conflicts in my schedule this morning make it impossible for me to attend your hearing on EPA's renewable oxygenate standard (ROS).

I therefore ask that my letter sent to President Clinton today, along with the enclosed enlightening analysis regarding federal energy subsidies, be made part of today's hearing record.

The letter and enclosure are self-explanatory, and I hope helpful to your committee's consideration of the ROS.

I appreciate your assistance.

Sincerely,



Charles E. Grassley  
United States Senator

CEG/cc  
Enclosures

93-769



## Committee Assignments:

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## PREPARED STATEMENTS

**John W. McClelland**

Mr. Chairman and Members of the Committee, thank you for the opportunity to discuss ethanol and its relation to agriculture. I am accompanied by Dr. Michael S. Graboski, director, Colorado Institute for Fuels and High Altitude Engine Research, Colorado School of Mines, Golden, Colorado. Dr. Graboski is the Principal Investigator on a Cooperative Research Agreement between USDA and the Colorado School of Mines. This statement and supporting documents are submitted to the committee with the request that they be included in the record.

USDA strongly supports EPA's proposed rule for a renewable oxygenate requirement (ROR) for reformulated gasoline. USDA believes this proposal would provide greater opportunities for ethanol and other renewable oxygenates and, as a result, reduce U.S. energy requirements, lower the level of Government farm program payments, enhance the well being of farmers and others living in rural America, and improve the environment.

USDA's analysis of the EPA proposal shows that full implementation would require approximately 680 million gallons of ethanol to be used in reformulated gasoline. About 500 million gallons of this would have to come from new production in order for the ethanol industry to maintain existing markets. USDA believes this new production can be added to existing capacity by early to mid-1995.

### ETHANOL ENERGY REQUIREMENTS

Agriculture and particularly ethanol processing have been criticized as being large consumers of energy. USDA believes that this is not the case. USDA analysis of data collected in our annual surveys of the Nation's farmers indicates that the farm energy index (the measure of total energy used in agricultural production) fell from 108 in 1980 to 60 in 1991. Much of this decline is due to more fuel-efficient power equipment and energy-efficient farming practices. The amount of gasoline, diesel, natural gas, and LP gas fell from 1.3 quadrillion BTU in 1978 to 650 trillion BTU in 1989. At the same time less energy was being consumed, the amount of output per unit of energy input was increasing. The index of aggregate agricultural output per unit of energy input has increased from 92 in 1974 to 185 in 1990.

The data just cited support the general conclusion that agriculture is considerably more energy efficient than it was 10 to 15 years ago. However, this general knowledge does not answer the specific question about the energy requirements for producing ethanol from corn. Using the Farm Cost and Returns Survey data, we have estimated the amount of energy needed to produce a bushel of corn. Table 1 of this statement shows that on average a bushel of corn requires 53,874 BTU of direct energy to produce. Because each bushel produces 2.5 gallons of ethanol, the energy input for corn per gallon of ethanol is 21,294 BTU. When we include indirect energy which accounts for the efficiencies of the direct energy inputs, the total BTU per bushel becomes 60,695, or 24,278 BTUs per gallon of ethanol.

The next step in our analysis was to estimate the energy requirements for converting corn into ethanol. Using engineering studies of existing commercial plants, we estimated the average energy requirements for producing a gallon of ethanol. The results are contained in the supporting document submitted for the record. Tables 10, 11, and 12 show ethanol's total energy summary, that is, the total energy balances including energy inputs for growing, harvesting and transporting corn, and processing and transporting ethanol. These tables show that ethanol has a positive net energy balance of at least 108 percent. That is, for every 100 BTUs of fossil energy used to produce ethanol, 108 BTUs of ethanol are produced.

The energy efficiency of the total ethanol production cycle can be compared with that of other liquid transportation fuels and their components. For example, gasoline production is between 75 and 80 percent energy efficient when extraction, transportation, and process energy are accounted for. Methanol, a major component in MTBE production, is only about 55- to 60-percent energy efficient by the same accounting. Therefore, contrary to assertions that ethanol production requires more fossil energy to produce than is contained in ethanol, our analysis shows that ethanol has a positive energy balance and uses less fossil energy to produce than other liquid transportation fuels on a BTU equivalent basis. Furthermore, when USDA analyzed the amount of crude oil input required to make a BTU of ethanol and compared that with the crude input required to make a BTU of gasoline, we found that the amount of crude needed to make one BTU of gasoline can make eight BTUs of ethanol.

## EFFECTS ON GOVERNMENT OUTLAYS

Questions have also been raised concerning the effects of the renewable oxygenate requirement on Federal Government budget outlays. USDA has analyzed these effects with respect to farm program outlays and the loss in revenues that would occur if additional ethanol that qualifies for tax incentives is produced. Recently, Senator Kerrey of Nebraska asked the department to provide an analysis of the effects on farm programs of a 30-percent renewable oxygenate requirements. USDA analysis concluded that the 30 percent ROR will save \$3 billion in farm program outlays between 1995 and 2000. These reduced outlays are primarily due to the effect of higher corn prices and lower deficiency payments. Higher corn prices reduce deficiency payments and increase revenues to U.S. corn farmers.

The General Accounting Office (GAO) analyzed the budget effects of increased ethanol use in motor fuels in a 1990 report. The GAO study considered the effects of increasing ethanol production by 1 to 2 billion annual gallons. The annual effects analyzed included decreases in Federal Highway Trust Fund revenues, decreases in farm program deficiency payments, and effects on other agricultural sectors. The report concluded "that reductions in farm program outlays would exceed the additional tax revenue losses, on average, by about \$488 million and \$608 million per year . . ." (GAO/RCED-90-156, July 1990).

USDA estimates revenue losses between 1995 and 2000 would be about \$900 million either from the Highway Trust Fund or from general revenues, depending on whether the excise tax exemption or the blenders tax credit was used as the means for accessing ethanol tax benefits. This calculation is based on an estimated demand for new ethanol production of 500 million gallons and an after-tax benefit of 35.1 cents per gallon. Thus, subtracting the \$900 million from the farm program savings of \$3 billion, the net savings to the Government, if the ROR is implemented, could exceed \$2 billion.

USDA is continuing to work with other agencies to resolve any analytical differences we have regarding this proposal. This concludes my remarks, I will be glad to answer any questions the subcommittee may have at this time.

**AN ANALYSIS OF THE TOTAL ENERGY REQUIREMENTS FOR ETHANOL  
MANUFACTURE FROM CORN**

**Dr. Roger K. Conway**

**Dr. John McClelland**

**Dr. Hosein Shapouri**

**U.S.Department of Agriculture  
Office of Energy**

**Dr. Michael S. Graboski**

**Colorado School of Mines  
Golden Colorado**

**1/31/94**

## INTRODUCTION

The purpose of this report is to provide a more comprehensive analysis of the energy requirements to produce ethanol from corn via both wet milling and dry milling ethanol conversion technologies. In this analysis, we have attempted to use a combination of the most up to date farm energy use data developed by USDA staff, modern dry milling and wet milling energy inputs coupled with appropriate coal based cogeneration for heat and power needs, and energy conversion efficiencies provided by the EPA(1993).

In the overall analysis, we have not elected to apportion the energy requirements based upon the various products from the corn refinery. Various schemes have attempted to replace corn farming energy with soybean production to establish farming credits, and have partitioned ethanol plant energy based upon the final product BTU or revenue assignments. Instead, we have simply assigned all farm energy costs to producing ethanol. In the dry milling facility case, we assigned all energy costs in processing to ethanol since dry mill facilities are built to produce ethanol. In the wet milling case, we only deducted energy from total plant needs which was clearly required for other high value product finishing. In either case, the overall net energy balance is positive. The worst case is the dry mill facility which has an overall energy efficiency of 108%, energy out as ethanol relative to all fossil energy inputs ( that is not counting solar input) but counting all other input efficiencies including extraction of the primary energy sources. The wet mill efficiency is similarly estimated to be 125%. These energy efficiencies should be properly compared to other energy plant efficiencies. Thus, according to EPA, a refinery yields only 74% of the original crude energy as finished gasoline product. Methanol plants return only about 55% of the input energy when gas production and transmission are included, and coal liquefaction and gasification plants return about 45% of the input energy counting coal mining. **It is clear that on a fossil energy input basis, ethanol production is by far the most efficient method of producing liquid transportation fuels from fossil energy.**

More importantly, corn based ethanol can be used to produce liquid fuels for transportation at high multiples of total petroleum based liquid fuels used in the overall ethanol cycle. **We estimate that the same amount of crude necessary to produce a BTU of gasoline can produce over eight BTU's of ethanol.** Thus, from a liquid fuel utilization point of view, ethanol can be used to extend our domestic crude reserves by a factor of eight, at least, or similarly reduce our import requirements.

## CALCULATIONAL BASIS

In the following analysis, all thermal inputs and outputs are made on a gross (higher heating ) value basis. The choice of basis , as long as it is applied in a consistent fashion, does not affect the overall results. Fuel properties were given by EPA (1993) and are provided in Table 1. We have added data for electricity based upon coal generation and transmission and HD-5 propane to Table 1.

## RAW MATERIAL INPUT EFFICIENCIES

In order to properly estimate the overall efficiency of producing ethanol and other fuels from fossil inputs, an accurate accounting of all extraction and production losses involved in delivering the final products must be available. In the current study, the data presented by EPA (1993) for production of coal, natural gas, crude oil based products including refining, and electricity generation and transmission were applied to the manufacture of ethanol from corn.

Table 2 presents the various efficiencies cited by EPA for the major fossil energy components involved in ethanol manufacture. In Table 2, the efficiency is a measure of the energy required to mine or extract, deliver the raw materials, and manufacture the energy product. The type of steps involved are indicated in the table. These efficiency parameters have been used to relate the energy required to deliver 1 MM BTU (million BTU) of each of the finished products listed in Table 3 based upon only the inputs of crude, coal, and natural gas and natural gas liquids. The difference between the total BTU requirement and the total crude input where applicable is the estimated energy loss due to venting of gas associated with crude production. Also included is an estimate of the total CO<sub>2</sub> produced for each fuel including that from combustion and all recovery and manufacturing inputs for the fuel. The CO<sub>2</sub> estimates are in good agreement with the values reported by EPA (1993), suggesting that the efficiencies used were applied in a consistent fashion. All energy and CO<sub>2</sub> generation data for fuels includes appropriate charges for distribution and, where appropriate, dispensing in accordance with energy requirements provided by EPA(1993).

## FARMING INPUTS

Farm input data were estimated by Shapouri and Duffield(1994) based upon USDA statistics. In this study, the farm average energy use was weighted using the ethanol production capacity for each relevant state. Except as discussed below, the reader is referred to that study for the detailed farm inputs.

## FERTILIZER

The energy in nitrogen based fertilizer manufacture was calculated from data reported by the Fertilizer Institute (1992). Energy for other fertilizer components was taken from the Fertilizer Institute (1987) except for lime which was taken from DeLuchi(1991). The Fertilizer Institute (1987) annual production data along with USDA (1991) fertilizer statistics were used to estimate the annual use of the various forms of nitrogen fertilizers and thus estimate the weighted energy consumption associated with nitrogen fertilizer. Shapouri and Duffield (1994) provided the fertilizer consumption data. Table 4 summarizes the fertilizer energy input data used. As Table 4 shows, 84% of the energy in the applied fertilizer is in the form of nitrogen which is manufactured almost completely from natural gas. The diesel mining component for the rock materials was estimated as 2765 BTU for

phosphate rock, potash and limestone.

We assumed following DeLuchi(1991), 150 miles of truck transport at 2000 BTU of diesel per ton mile and 1 gallon of diesel per ton for 500 miles of barge transport for the raw material and finished fertilizer. Transport energy was included in the diesel estimate.

## **CHEMICALS**

Farm chemical use including pesticides and herbicides were estimated from USDA data by Shapouri and Duffield(1994). Turhollow and Perlack(1991) provide manufacturing and transportation energies for these materials and estimate that the primary feedstocks for farm chemical manufacture are 60% as oil, 23% as natural gas and 17% as power. This breakdown was applied to the overall production energy requirements. Power was assumed to be produced from coal for this estimate. The chemical input includes all transportation energy.

## **CORN TRANSPORT**

The Shapouri and Duffield estimate included transport of the corn to the local elevator. According to USDA, this transportation represents approximately 25% of the total transport energy to the mill. The total corn transportation was estimated by assuming 2000 BTU of diesel per ton mile and transport of corn for a total of 50 miles. This is a typical average collection radius for a large corn processing facility.

## **FARM ENERGY SUMMARY DATA**

Table 5 summarizes the farming inputs. Both direct farm inputs and total inputs based upon Table 3 efficiencies are presented.

## **ETHANOL PRODUCTION**

Ethanol production facilities are based upon both wet milling and dry milling operations. Dry mills represent smaller production facilities and are built primarily to manufacture ethanol. Wet mill facilities are "corn refineries", producing a host of high valued products. Detailed descriptive information on dry milling plants is provided by Madson (1991) and Katzen et al (1992). Similar information on wet milling operations was reported by DeSpiegelaere (1992) and by Wood (1993).

## **ENERGY REQUIREMENTS**

Based upon reported thermal and power inputs for wet and dry milling facilities, the following overall manufacturing requirements given in Table 6 were established.



TABLE 6

**ENERGY REQUIREMENTS FOR ETHANOL PLANTS  
PER GALLON OF ETHANOL PRODUCTION**

<b>PLANT TYPE</b>	<b>THERMAL</b>	<b>ELECTRICAL</b>
<b>DRY MILL</b>	<b>37,000 BTU</b>	<b>1.2 KWH</b>
<b>WET MILL</b>	<b>28,150 BTU</b>	<b>0.974 KWH</b>

**DRY MILL**

Katzen et al(1992) recently reported the energy requirements cited in Table 6 for the South Point Ethanol plant. These energy requirements are as steam input and electrical input to the various manufacturing steps. The typical dry mill facility produces 2.6 gallons of ethanol per bushel of corn.

**WET MILL**

DeSpiegelaere(1992) reported that proven wet mill operations require 35,510 BTU and 2.134 KWH per gallon of ethanol production based upon azeotropic distillation. While molecular sieves are reported to be commercial for smaller dry milling facilities, they are not yet reported to be commercial in large wet mills. Molecular sieves would reduce the thermal input to 32,150 BTU per gallon. We assumed an azeotropic system.

DeSpiegelaere reported that of the total thermal energy, 7000 BTU per gallon and 1.16 KWH were related to drying of high grade germ, fiber and gluten. These values were deducted from the total inputs to yield the values in Table 6. Wet mills produce 2.5 gallons of ethanol per bushel on average.

**ENERGY COGENERATION**

Industry representatives have indicated that modern wet and dry mill ethanol plants employ cogeneration technology to produce steam and in-house power. In addition, in many operations, flue gas drying of products is practiced. In our analysis, we coupled a modern coal based cogeneration system to the wet and dry mill facilities to supply power and steam from coal.

Figure 1 shows the cogeneration scheme employed. Based upon the thermal and electrical needs of 30 million gallon per year and greater plants, relatively sophisticated cogeneration facilities can be economically justified. For example, a 30 million gallon per year plant requires 150 MM BTU per hour of steam for all needs, the equivalent of a 15 MW coal plant. Such scale facilities typically produce relatively high quality steam for the process. One midwest wet mill operator indicated that his cogeneration facility was based

upon 850F, 850 psi steam with backpressure steam taken at above 150 psi for process heating. In that facility, flue gas drying is practiced with a pre-dryer boiler stack temperature in the range of 500F. Flue gas is routinely reduced to 250 F in that drying operation.

Tables 7 and 8 provide closed energy balances for the cogeneration facility for dry and wet facilities respectively. In both cases, back pressure conditions were found such that sufficient steam of adequate quality could be taken from turbine exhaust to satisfy thermal requirements. The boiler was fired with 20% excess air in each case which is representative of modern boiler technology. Two percent heat loss was assumed. On this basis, the boiler efficiency applied to the calculations was estimated to be 82% on a HHV basis. Other excess air and heat loss assumptions will affect the results.

In operating a non-condensing turbine for power generation, the efficiency of power generation is 100%; that is 1 BTU of steam is directly converted to 1 BTU of electricity regardless of the turbine isentropic efficiency, ignoring generator inefficiency and turbine heat losses. The efficiency only affects the turbine size. We assumed a 95% generator efficiency within the plant.

Tables 7 and 8 show that the total coal inputs for modern dry and wet mill facilities are typically 47,400 and 36,400 BTU per gallon respectively on this basis.

## **ETHANOL DISTRIBUTION**

Following EPA(1993), we estimated distribution and dispensing energy requirements for ethanol. We included shipping to both the terminal and the retailer in this estimate. Further, to be consistent, we increased the energy distribution charge recommended by EPA in proportion to the relative energy densities of gasoline and ethanol. Table 9 presents overall energy for manufacture of ethanol from dry and wet milling plants including distribution.

## **OVERALL ENERGY BALANCE**

Based upon the information presented in the previous sections the overall energy requirements and various efficiency measures are presented in Tables 10 and 11. Both wet and dry mill facilities with no by-product credits for energy use in farming or processing (except for by-product finishing in wet mill operations) provide net energy ratios greater than one and leverage oil input to liquid fuels by a factor of about eight.

It is interesting to note that significant natural gas goes into this processing. In fact, the amount of natural gas used could make about 40% of the methanol required to produce MTBE of volume equal to the ETBE which could be made from the ethanol. Thus, the production of ethanol is favorable to the domestic gas industry relative to methanol imports for MTBE manufacture.

The manufacture of ethanol supports the coal industry. Thus, while the coal industry has not been successful in promoting large coal to energy plants producing methanol and other liquid fuels, ethanol represents a way of expanding coal production to convert low quality fuel BTU's to high valued liquid fuels.

## WEIGHTED PRODUCTION ANALYSIS

Table 12 presents the weighted wet and dry mill results from this analysis. The weighting was accomplished by using a ratio of 2 for wet to dry capacity and the appropriate production capacity, gallons per bushel, for each technology.

We were able to directly compare our results with the study from EPA(1993). The ethanol energy input for their "best case" of 40,000 BTU/gallon translates to a total input of 70,324 BTU/gallon and an overall net energy efficiency of 119%. **EPA's best case is equivalent to USDA's estimate of the current state of the art industry case.** New technology which is introduced in the next several years will only increase the net energy efficiency of ethanol plants.

The use of cogeneration for steam and power appears to not be considered in the EPA net energy analysis. However, the industry is using this technology. To demonstrate the economic advantage of cogeneration Wood estimates steam value at \$3 per 1000 pounds and power at \$0.05 per kwh for his economics. If a lower pressure boiler was utilized in a modern plant and power was purchased, an electricity cost of about \$1.8MM per year would result for a 30 MM gal per year facility. Based upon our experience, the incremental capital cost to install a non-condensing turbine and increase the boiler pressure rating might be about \$5 MM. With maintenance at 3% of capital and coal at \$1/MM BTU, the cogeneration simple payback period would be about 3.3 years. Obviously, in any new facility this approach would be followed compared to internal steam production and purchase of power.

In our analysis, we assumed no by-product credits. This assumption puts a lower floor on any energy efficiency estimate. With this assumption, we still show that ethanol plants return more useful liquid fuel energy that they consume in fossil energy. We do believe it is fair and appropriate to assign energy value in some fashion to the coproducts.

Finally, we conclude that the result of our analysis is similar to the much cited analysis of Morris and Ahmed(1992). We were not able to obtain the calculations made by those authors; however, they represented to us that their thermal calculations were based upon actual energy audits of working ethanol plants, including inspection of actual coal and where applicable electrical energy deliveries.

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8

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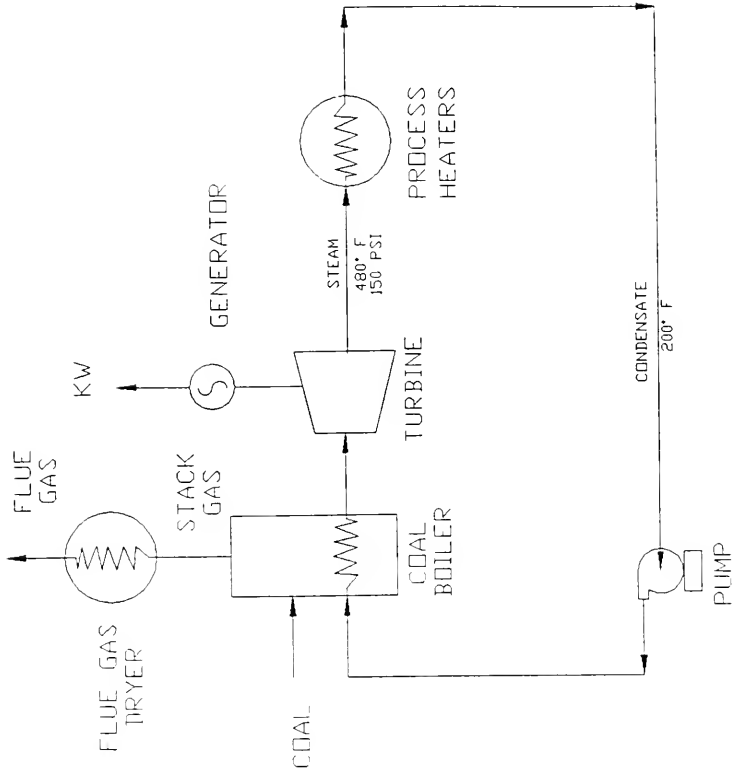


FIGURE 1  
COGENERATION SCHEMATIC

TABLE 1  
PROPERTIES OF FUELS

FUEL	DENSITY	WEIGHT %	GROSS HEATING
	LB/GALLON	CARBON	VALUE (HHV)
			BTU/GALLON
GASOLINE	6.2	86.5	125,073
DIESEL	7.12	87.4	137,202
NATURAL GAS		(ASSUMED AS 3% CO <sub>2</sub> )	989 BTU/SCF
HD-5 PROPANE	4.24	82	91,650
FUEL OIL	8.33	84.9	157,495
COAL		66.9	12,113 BTU/LB
ELECTRICITY			12,456 BTU/KWH
ETHANOL	6.58	52.2	83,961



TABLE 3

## DERIVED PRODUCTION EFFICIENCY DATA FOR FOSSIL INPUTS

FINAL FUEL	TOTAL	MM BTU	MM BTU	SCF CO2
	EFFICIENCY, %	INPUT	CRUDE INPUT	MM BTU
FUEL OIL	94.82	1.055	1.04	1,504
DIESEL	86.67	1.154	1.13	1,655
GASOLINE	74.11	1.349	1.33	1,856
LPG	89.91	1.112	0.00	1,124
NATURAL GAS	89.91	1.112	0.00	1,124
COAL	96.35	1.038	0.038	1,811

NOTES: TOTAL EFFICIENCY REFLECTS BTU OF PRODUCT FUEL FROM ALL INPUTS AND LOSSES

MM BTU INPUT INCLUDES ALL BTU INCLUDING CRUDE VENT GAS LOSSES PER BTU OF FINAL PRODUCT

MM BTU CRUDE INCLUDES ALL INPUTS EXCEPT VENT LOSSES



TABLE 4					
FERTILIZER TOTALS					
	POUNDS			BTU	
NITROGEN	1.097			24309	
PHOSPHATE	0.575			2401	
POTASH	0.496			617	
LIME	2.69			1668	
TOTAL	4.858			28994	
SOURCE: FERTILIZER INSTITUTE					

TABLE 5

## FARM ENERGY REQUIREMENTS FOR ONE BUSHEL OF CORN

CATAGORY	DIRECT BTU/BU	FEEDSTOCK	TOTAL BTU/BU
CHEMICALS	5,770	OIL,NG,KW	6,087
FERTILIZER	28,994	NG,OIL	32,357
DIESEL	8,455	DIESEL	9,757
GASOLINE	3,448	GASOLINE	4,652
LPG	4,952	NG	5,507
POWER	2,129	COAL	2,210
SEED	125	SOLAR	125
TOTAL	53,874		60,695

TABLE 7

### DRY MILL ETHANOL PLANT PROCESS DATA

PLANT ELECTRICAL USE		1.20 KWH/GAL			
BOILER HEAT LOSS		2.00%			
THERMAL REQUIRED		37000.00 BTU/GAL			
TURBINE EX STEAM		36.96 LB /GAL			
TURBINE STEAM THERMAL		34505.14 BTU/GAL			
TURBINE STM + FLUE GAS		37001.65 BTU/GAL			
TOTAL STEAM PRODUCED		36.96 LB /GAL			
TOTAL STEAM PRODUCED		38959.45 BTU/GAL			
BFW PUMP WORK		0.04 KWH			
REQUIRED COAL		3.70 LB/GAL			
BOILER EFF		82.15%			
TOTAL COAL		47424.702 BTU/GAL			
FLUE GAS TEMPERATURE		500 F			
EXIT TEMPERATURE		250 F			
FLUE GAS		2496.51 BTU/GAL			
BOILER MASS BALANCE					
INPUT DATA			REQUIRED	FLUE GAS	
COAL	LB	MOLES	O <sub>2</sub> , MOLES	MOLES	
C	71	5.92	5.92	CO <sub>2</sub>	5.92
H	5.6	2.80	1.40	H <sub>2</sub> O	3.11
N	1.6	0.06	0.00	N <sub>2</sub>	31.63
S	2.7	0.08	0.08	SO <sub>2</sub>	0.08
O	13	0.41	-0.41	O <sub>2</sub>	1.40
ASH	6.1				
BTU	12810				
MOISTURE	10	0.31	0.00		
TOTAL			6.99		42.15
XS AIR	20.00%				
STEAM TURBINE ENTHALPY DATA					
STEAM IN TO TURBINE					
T, F			850		
P, PSI			850		
H, BTU/LB			1425		
S, BTU/LB F			1.6115		
IDEAL WORK			160.74		
TURBINE EFFICIENCY			0.75		
ACTUAL WORK			120.56		
ACTUAL OUTLET STEAM, BTU/LB			1304.4432		
CONDENSATE H, BTU/LB			200.00		
POWER @95% GEN EFFICIENCY			0.03 KWH/LB		

TABLE 8				
WET MILL ETHANOL PLANT PROCESS DATA				
		BACKPRESSURE		
PLANT ELECTRICAL USE		0.97 KWH/GAL		
THERMAL REQUIRED		28150.00 BTU/GAL		
BOILER HEAT LOSS		2.00%		
TURBINE EX STEAM		28.33 LB /GAL		
TURBINE STEAM THERMAL		26243.35 BTU/GAL		
TURBINE STM + FLUE GAS		28156.66 BTU/GAL		
TOTAL STEAM PRODUCED		28.33 LB /GAL		
TOTAL STEAM PRODUCED		29858.25 BTU/GAL		
BFW PUMP WORK		0.03 KWH		
REQUIRED COAL		2.84 LB/GAL		
BOILER EFF		82.15%		
TOTAL COAL		36345.96 BTU/GAL		
FLUE GAS TEMPERATURE		500 F		
EXIT TEMPERATURE		250 F		
FLUE GAS		1913.31 BTU/GAL		
		BOILER MASS BALANCE		
INPUT DATA		REQUIRED		FLUE GAS
LB	MOLES	O2, MOLES	MOLES	
71	5.92	5.92	CO2	5.92
5.6	2.80	1.40	H2O	3.11
1.6	0.06	0.00	N2	31.63
2.7	0.08	0.08	SO2	0.08
13	0.41	-0.41	O2	1.40
6.1				
12810				
10	0.31	0.00		
		6.99		42.15
20.00%				
STEAM TURBINE ENTHALPY DATA				
STEAM IN TO TURBINE				
T, F		850		
P, PSI		850		
H, BTU/LB		1425		
S, BTU/LB F		1.6115		
IDEAL WORK		170.43		
TURBINE EFFICIENCY		0.75		
ACTUAL WORK		127.83		
ACTUAL OUTLET STEAM, BTU/LB		1297.175		
CONDENSATE H, BTU/LB		200.00		
POWER @95% GEN EFFICIENCY		0.04 KWH/LB		

TABLE 9

## ETHANOL PRODUCTION AND DISTRIBUTION ENERGY DATA

	% EFF	DRY MILL BTU/GAL	WET MILL BTU/GAL	FEEDSTOCK
CORN DELIVERY		808	840	DIESEL
PLANT COAL		47,425	36,343	COAL
DISTRIBUTION	97.02	2,501	2,501	DIESEL
DISTRIBUTION	99.20	672	672	POWER

TABLE 10  
TOTAL ENERGY SUMMARY  
DRY MILL FACILITY

BTU PER BUSHEL OF CORN

INPUT	PRIMARY	TOTAL	GRAND TOTAL
ETHANOL COAL	123,304	123,304	123,304
POWER COAL	5,029	5,029	5,029
TOTAL COAL	128,334	128,334	128,334
NATURAL GAS	27,383	30,456	30,456
LPG	4,952	4,952	4,952
TOTAL GAS	32,335	35,964	35,964
FUEL OIL	3,462	3,462	3,462
DIESEL	19,823	27,887	28,480
GASOLINE	3,448	4,571	4,652
TOTAL OIL	26,733	36,100	36,656
TOTAL BTU IN	187,402	200,398	200,954
TOTAL OIL BTU IN	26,733	36,100	36,656
TOTAL BTU OUT	218,298	218,298	218,298
BTU OUT/BTU IN	1.165	1.089	1.086
BTU OUT/BTU OIL	8.17	6.05	5.96
BTU ETOH/BTU GASOLINE		8.224	

NOTE: TOTAL INCLUDES DIESEL COAL MINING AND CRUDE EFFICIENCY  
GRAND TOTAL ALSO INCLUDES VENT GAS

TABLE 11  
TOTAL ENERGY SUMMARY  
WET MILL FACILITY

BTU PER BUSHEL OF CORN

INPUT	PRIMARY	TOTAL	GRAND TOTAL
ETHANOL COAL	90,865	90,865	90,865
POWER COAL	4,962	4,962	4,962
TOTAL COAL	95,827	95,827	95,827
NATURAL GAS	27,383	30,456	30,456
LPG	4,952	4,952	4,952
TOTAL GAS	32,335	35,964	35,964
FUEL OIL	3,462	3,462	3,462
DIESEL	19,573	26,215	26,772
GASOLINE	3,448	4,571	4,652
TOTAL OIL	26,483	34,248	34,948
TOTAL BTU IN	154,645	166,039	166,739
TOTAL OIL BTU IN	26,483	34,248	34,948
TOTAL BTU OUT	209,902	209,902	209,902
BTU OUT/BTU IN	1.357	1.264	1.259
BTU OUT/BTU OIL	7.93	6.13	6.07
BTU ETOH/BTU GASOLINE		7.71	

NOTE: TOTAL INCLUDES DIESEL COAL MINING AND CRUDE EFFICIENCY  
GRAND TOTAL ALSO INCLUDES VENT GAS

TABLE 12

ETHANOL ENERGY SUMMARY  
WEIGHTED BY PRODUCTION CAPACITY

FUEL TYPE	BTU/GALLON
COAL	42,007
NATURAL GAS AND LPG	14,198
FUEL OIL	1,367
DIESEL	10,791
GASOLINE	1,837
TOTAL INPUTS	70,200
ETHANOL OUT	83,961
RATIO	1.20



## Richard D. Wilson

Good morning, Mr. Chairman and Members of the committee. I am pleased to appear before you today to testify on issues pertaining to EPA's proposed renewable oxygenate rule. Before discussing the details of the renewable Oxygenate rule, I'd like to provide some historical background on the events that led EPA to propose this rule.

As you know, the reformulated gasoline program begins on January 1, 1995. Congress required the nine most heavily polluted cities to participate in the program and permitted states to opt into the program for other ozone nonattainment areas. The reformulated gasoline used in the nine cities and current opt-in areas will account for approximately one-third of total U.S. gasoline consumption.

The Clean Air Act (Act) provides broad guidelines for reformulated gasoline specifications. The statute mandates that reformulated gasoline contain at least 2-percent oxygen by weight and no more than 1-percent benzene by volume. It also mandates that reformulated gasoline achieve a minimum of 15-percent reduction in ozone-forming volatile organic compounds, or VOCs, and specified air toxics in 1995 through 1999. The Act establishes a more stringent 25-percent minimum reduction target for VOC and toxics beginning in the year 2000. Additionally, the statute includes an anti-dumping program to ensure that emissions from gasoline not covered by the reformulated gasoline program would not increase from 1990 levels. EPA was required to establish the detailed requirements and regulations governing the reformulated gasoline and anti-dumping programs.

Because of the complexity of the issues involved in these rules, EPA decided to attempt a regulatory negotiation with all affected parties. Months of intense negotiations ensued among representatives of the states, oxygenate producers, farm interests, environmental groups, the oil industry, the automobile industry, the driving public, the EPA, and the Departments of Energy and Transportation. Compromises by all participants were made and an Agreement in Principle was signed by all participants in August 1991.

The Clean Air Act provisions establishing the reformulated gasoline program do not mandate the use of any particular oxygenate. A desire to retain refiner flexibility regarding choice of oxygenate is reflected in the Act's legislative history. However, that history also indicates that many parties expected ethanol to play a significant role in the reformulated gasoline program.

Section 211(k)(1) of the Act directs EPA to establish reasonable requirements for reformulated gasoline, including regulations to achieve the greatest possible reduction in emissions of VOCs and toxics. When setting the reformulated gasoline emission performance standards, the Agency is directed to consider the cost of emission reductions, any nonair quality, and other air quality effects, related health and environmental impacts, and energy requirements. As mentioned previously, the Act stipulates certain compositional specifications, such as the 2-percent oxygen content requirement. To meet this requirement, oxygenates must be added to gasoline. The two most common oxygenates used today are MTBE and ethanol. MTBE is an ether derived primarily from methanol, which in turn is produced from natural gas. Ethanol is an alcohol produced primarily from corn, though it can be produced from other feedstocks as well. A third oxygenate, ETBE, is an ether derived from ethanol.

The 1991 regulatory negotiation agreement formed the basis for EPA's proposed rule on reformulated gasoline issued in April 1992. Just before that proposal was announced, however, ethanol supporters raised concerns about the role of ethanol in reformulated gasoline.

Splash-blending any alcohol, whether it be ethanol or methanol, with gasoline raises the volatility of the blend, which leads to increased evaporative emissions from motor vehicles. This makes it difficult for such a blend to achieve the summertime VOC emission reduction requirements of reformulated gasoline. EPA has, however, always believed ethanol could play a significant role in reformulated gasoline, either directly or in the form of ETBE which does not increase gasoline volatility. Direct use of splash-blended ethanol in winter months would pose no difficulties, and ethanol blended with low-volatility blendstocks could be used in the summer months. Nonetheless, the ethanol industry and farm interests expressed concern that EPA's proposed program would effectively exclude ethanol from the reformulated gasoline market. They sought a summer volatility waiver for ethanol-based reformulated gasolines. Other signatories to the—regulatory negotiation agreement such as the oil industry, methanol and ether producers, states, and environmental groups opposed such a waiver. At the request of ethanol and farm interests, the Agency held a public hearing to receive testimony on this and other issues in June 1992 in Chicago.

In the fall of 1992, former President Bush directed the Environmental Protection Agency to propose a program to promote the use of ethanol and other renewable oxygenates in the reformulated gasoline program during the summer. This program would have granted ethanol blends the equivalent of a one psi volatility waiver during the summer by requiring other reformulated gasolines to have lower volatility in order to offset the volatility increase of the ethanol blends.

The Bush ethanol proposal was opposed by nearly all commenters. Ethanol interests, State regulators, environmental groups, and the oil industry objected to it on legal and environmental grounds and/or claimed that the program would be unworkable. Consequently, EPA decided not to promulgate the Bush Ethanol Program as part of the final rule for reformulated gasoline, which was signed by EPA Administrator Carol Browner in December 1993.

In December 1993, the Agency also proposed a different strategy to help assure a role for renewable oxygenates, such as ethanol, in an environmentally friendly way. This proposal requires that 30 percent of the oxygen in reformulated gasoline come from renewable sources, such as ethanol or methanol not made from fossil fuels. To prevent detrimental environmental effects in the summer months, the proposal would not count toward the 30-percent requirement oxygenates such as ethanol which increase evaporative emissions when gasoline is commingled in-use. The proposal includes year-round, nationwide trading provisions to minimize cost and maximize flexibility.

The intent of the current renewable oxygenate proposal would be to assure that oxygenates, such as ethanol, and potentially MTBE or ETBE, which are based on renewable resources have a substantial share of the reformulated gasoline oxygenate market, without sacrificing the environmental goals of the reformulated gasoline program. EPA believes that this program will assure the diversity of oxygenates in the marketplace. By assuring renewable oxygenates a place in the market, this program will help stimulate commercialization of more advanced technologies with even greater environmental and energy benefits. Expanding the use of renewable fuels made from domestic resources such as corn, grain, wood, and even garbage can help reformulated gasoline clean the air in our cities, lower long-term emissions of harmful greenhouse gases, and reduce the use of fossil fuels.

EPA believes it has statutory authority to promulgate such a program, which EPA believes will provide beneficial effects on fossil energy consumption and greenhouse gas emissions. In the December proposal, EPA specifically asked for comments on the issues of statutory authority, fossil energy consumption, greenhouse gas emissions, and adequacy of ethanol supply, among other topics. The Agency also held a public hearing on January 14, 1994 to receive testimony regarding the renewable oxygenate proposal. The subsequent comment period closed on February 14, 1994. In excess of 12,000 comments were received on the proposal. The Agency is presently evaluating these comments and plans to announce a final decision on the proposal in June of this year. As part of this process, we are coordinating with other Federal agencies, including the Departments of Energy, Agriculture, Transportation, and Treasury and the Office of Management and Budget.

I would also like to assure the committee that EPA is working closely with fuel providers to assure the smooth implementation of the reformulated gasoline program as a whole. As part of this process, we are working with refiners of all sizes, pipeline operators, terminal operators, marketers, and oxygenate suppliers to address and resolve potential problems before they occur.

Thank you for the opportunity to discuss these matters with you. I would be happy to answer any questions you may have.



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